

VOLUME LXXI

NUMBER ONE

THE NATIONAL GEOGRAPHIC MAGAZINE

912.7 / N.G.M. JANUARY, 1937

31146

TWENTY-FOUR PAGES OF ILLUSTRATIONS IN FULL COLOR

As London Toils and Spins

With 38 Illustrations

FREDERICK SIMPICH

The Pomp and Pulse of Modern London

23 Natural Color Photographs

B. ANTHONY STEWART

Bedouin Life in Bible Lands

With 28 Illustrations

JOHN D. WHITING

Field Dogs in Action

With 8 Illustrations

FREEMAN LLOYD

Man's Hunting Partner, the Field Dog

36 Portraits in Color from Life

EDWARD HERBERT MINER

Uganda, "Land of Something New"

With 23 Illustrations

JAY MARSTON

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
WASHINGTON, D.C.

\$3.50 A YEAR

50c THE COPY

NATIONAL GEOGRAPHIC SOCIETY

GEOGRAPHIC ADMINISTRATION BUILDINGS

SIXTEENTH AND M STREETS NORTHWEST WASHINGTON D C

GILBERT GROSVENOR, President
ROBERT V. FLEMING, Treasurer
HERBERT A. POOLE, Assistant Treasurer
FREDERICK V. COVILLE, Chairman Committee on Research

JOHN OLIVER LA GORCE, Vice-President
GEORGE W. HUTCHISON, Secretary
THOMAS W. MCKENNA, Assistant Secretary

EXECUTIVE STAFF OF THE NATIONAL GEOGRAPHIC MAGAZINE

GILBERT GROSVENOR, EDITOR

JOHN OLIVER LA GORCE, Associate Editor

J. R. HILDEBRAND, Assistant Editor
MELVILLE BELL GROSVENOR, Assistant Editor
McFALL KERSEY, Chief of School Service
LEO A. BORAH, Editorial Staff

FREDERICK SIMPICH, Assistant Editor
ALBERT H. BUMSTEAD, Chief of Cartography
E. JOHN LONG, Editorial Staff

FRANKLIN L. FISHER, Chief Illustrations Division
MAYNARD OWEN WILLIAMS, Chief Foreign Editorial Staff
CHARLES MARTIN, Chief Photographic Laboratory
LEONARD C. ROY, Editorial Staff

BOARD OF TRUSTEES

ROBERT V. FLEMING, President and Chairman of the Board, Riggs National Bank
WALTER S. GIFFORD, President American Telephone and Telegraph Co.
DAVID FAIRCHILD, Special Agricultural Explorer U. S. Department of Agriculture
C. HART MERRIAM, Member National Academy of Sciences
LYMAN J. BRIGGS, Director National Bureau of Standards
GEORGE R. PUTNAM, Commissioner of Lighthouses, Retired
THEODOR W. NOYES, Editor of The Evening Star
GEORGE W. HUTCHISON, Secretary National Geographic Society

CHARLES EVANS HUGHES, Chief Justice of the United States
WILLIAM V. PRATT, Rear Admiral U. S. Navy, Retired
RAYMOND S. PATTON, Rear Admiral Director U. S. Coast and Geodetic Survey
ALEXANDER WETMORE, Assistant Secretary Smithsonian Institution
GILBERT GROSVENOR, Editor of National Geographic Magazine
J. HOWARD GORE, Prof. Emeritus Mathematics The George Washington University
FREDERICK V. COVILLE, Botanist, U. S. Department of Agriculture
ELISHA HANSON, Lawyer and Naturalist

JOHN J. PERSHING, General of the Armies of the United States
GEORGE OTIS SMITH, Formerly Director U. S. Geological Survey
O. H. TITMANN, Formerly Superintendent U. S. Coast and Geodetic Survey
JOHN OLIVER LA GORCE, Associate Editor of the National Geographic Magazine
CHARLES G. DAWES, Formerly Vice-President of the United States
GEORGE SHIRAS, Formerly Member U. S. Congress, Faunal Naturalist and Wild Game Photographer
Oscar Westover, Major General Chief of U. S. Army Air Corps
CHARLES F. LUTTERING, President General Motors Research Corporation

ORGANIZED FOR THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE

To carry out the purposes for which it was founded forty-nine years ago the National Geographic Society publishes the National Geographic Magazine monthly. All requests for information in the Magazine itself or expended directly to

Articles and photographs are desired. For material which the Magazine can use generous remuneration is made. Contributions should be accompanied by self-addressed envelope and postage.

Immediately after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary eruption has been reported to the world. In a very short time the world was informed and excited. The Valley of Ten Thousand Smokes, a vast area of smoking vents, fumaroles, and geysers, is the result of the Society's expedition. As a result of the Society's expedition the eruption has been recorded in a book of 100 pages by publication of the President of the United States.


The Society's expedition to the Mt. Katmai eruption was a complete success. It was the first expedition to the Katmai eruption since 1912 and the first to the Katmai eruption since 1912.

The Society also had the honor of publishing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole and contributed \$100,000 to Admiral Peary's Antarctic Expedition.


The Society granted \$75,000 and in addition \$5,000 was given by individual members, to the Government when the congressional appropriation for the purpose was insufficient and the forest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

The Society's noble expedition to New Mexico have paid back the Society for a number of the most successful expeditions in a period of nearly eight years. The expedition to the Atlatl, by dating the ruins of the vast ancient Indian city of Chaco Canyon, the Society's expedition have a long record of having paid for the cost of three hundred years. The Society is sponsoring an expedition to survey of Venezuela.

On November 11, 1916, by a Congressional act, by the National Geographic Society and the U. S. Army, a large sum of money was given to the Society to be used for the purpose of the expedition to the Katmai eruption. The expedition to the Katmai eruption was a complete success. It was the first expedition to the Katmai eruption since 1912 and the first to the Katmai eruption since 1912.



THE NATIONAL GEOGRAPHIC MAGAZINE



COPYRIGHT 1936, BY NATIONAL GEOGRAPHIC SOCIETY, WASHINGTON, D. C. INTERNATIONAL COPYRIGHT SECURED

AS LONDON TOILS AND SPINS

BY FREDERICK SIMPICH

THAT S where they hanged Captain Kidd," said the launch skipper giving me a ride along London's water front

"Where did Captain John Smith sail from, when he went to found the Virginia colony?"

"Dead ahead in the stream, off where the old East India Docks now stand

"And there by Deptford pier is where the *Golden Hind* lay, when Queen Elizabeth came aboard to knight Francis Drake"

Thames traffic makes London the world's foremost river port. Since Roman galley days—when Britons traded grain, slaves, and dogskin for European salt and horse collars—commerce has flowed between London and the continental countries along the Schelde, the Rhine, and the Elbe. After Drake nerved England to smash the Spanish Armada, London ships gained in time the lion's share of ocean borne trade.

Names immortal in discovery and conquest are linked with this water front. From here Frobisher went seeking the Northwest Passage, and Hawkins to Puerto Rico and Veracruz, from here Lancaster made his voyages to the East, before the downfall of Portugal and the rise of the British East India Company. Raleigh sailed from here to explore the Orinoco, to popularize tobacco and, tradition says, to start the Irish planting potatoes.

It was London's daring money which sent Sebastian Cabot to found the Russia Company, opening trade with that land. London merchants and shippers promoted the Turkey, African, Virginia, and Hudson's Bay Companies.

London emigrants helped colonize in the Americas, in Australia, New Zealand, China, India, Africa, and the rich islands of the sea.

From this water front went the English language. In Drake's day only a few millions spoke it. Now it is a world tongue. Of all letters, telegrams, books and papers printed now, it is estimated that 70 per cent are in English. London alone uses enough newsprint every day to cover a ranch of 9,350 acres—or nearly 15 square miles of paper.

"The smell from that big paper mill at Bayswater is one of the marks I steer by on foggy nights," said a Thames pilot.

THE WORLD'S BUSIEST RIVER PORT

Exploration of London's crowded docks reveals not only what amazing piles of food a great city can normally eat, but also what odd items, from live bats to rhino horns, are mixed in the life stream of world commerce.

Imponderable, in variety and magnitude, are these fruits of man's barter. Here, too, his work ranges from ratcatching and opium sampling to dredging the Thames and handling annual cargo enough to fill a road with loaded trucks from the Yukon to Patagonia.

To say that every day some 500 craft, big and little, pass through the Thames mouth tells only half the story. More significant is what happens on the docks.

Even London people themselves don't dream what incredible activity is here. Few ever see it. Confusion on this crowded river, in days gone, grew so intense that



Photograph by B. Anthony Stewart

A MODEL OF LONDON PORT FOR DISPLAY AT JOHANNESBURG

One tiny vessel is seen about to pass under Tower Bridge. The artist whose seemingly gigantic hands move the ship operates a studio that employs architects skilled in modelmaking. For education in yellow fever control in Africa they built a mosquito six feet across! (Page 14)

waiting boats often lay unloaded for weeks, goods were piled in disorder on river banks, and pilfering was enormous. One river bandit stole almost a whole shipload of sugar! To combat this chaos the West India merchants built their own fortlike docks.

With more trade came more docks, and more toll rate wars and other confusion. This ended in 1909 when the Port of London Authority, a Royal Commission, took full control under Act of Parliament.

It paid £23 000,000 for privately owned London docks, spent millions more to make

the lower Thames the world's longest deep-water channel, and to enlarge and re-equip cargo handling facilities.

It has dredged mud enough out of the Thames to build a Chinese Wall, and has constructed the world's most extensive dock system. One of its cranes, the "London Mammoth," lifts 150 tons!

Finally, with characteristic British financial genius, it sold its debentures on the Stock Exchange, and now its operations usually pay all costs and interest and leave a profit which is used for more improvements.

"The PLA is not in trade," explained Sir David Owen, its general manager. "We are merely custodians of merchandise that may range from wild animals for the Zoo to a shipload of molasses for

which to distill fuel alcohol. We weigh goods, report on their quality and condition, we open bales and boxes for customs inspection, furnish samples for buyers and look after repacking and loading for those who ship from London to other ports."

AN AMAZING VARIETY OF GOODS

On the north bank of the Thames, scattered for miles downstream from the Tower, stand these great PLA docks: London, St Katharine, East and West India, Millwall, Victoria and Albert, King George V, and the Tilbury (page 8).

On the south bank, near London's heart, are ancient Surrey Commercial Docks, with a lumberyard that covers 150 acres! More wood is piled here than I have ever seen in any other spot. Sunshine followed a shower the day I spent there, and the place smelt pleasantly of fresh cut pine and spruce, a forest sawmill smell in the middle of London!

Besides the railways and truck lines that tie these docks to the outlying Kingdom, some 9,000 Thames barges handle goods to and from ships' sides.

Each dock has its own character. St Katharine Docks are built on the site of the old Church of St Katharine by the Tower, founded by Queen Matilda in 1148. What heterogeneous goods they store: wool, skins,

wines, spices, sugar, rubber, balata, tallow, ivory, barks, gums, drugs, coffee, iodine, hemp, quicksilver, canned fruits and fish, cor yarn, coconuts, and brandy!

West India and Millwall Docks lie in a river peninsula known as the Isle of Dogs. Here the passer by may smell 12,000 punch eons of rum, a million tons of sugar, and shiploads of dates.

Victoria and Albert and King George V Docks form one huge structure, the world's largest sheet of enclosed dock water.



© Fox Photos

"BEATING THE BOUNDS" AT THE TOWER OF LONDON

The Chief Warder watches as boys carry out a tradition dating back to Anglo Saxon times (page 56). Before towns and parishes were mapped youngsters were made to beat the local boundaries with sticks so they would never forget their 'city limits'. Sometimes the boys themselves were bumped against the boundary stones to make them remember! Sons of soldiers quartered in the Tower observe this ceremony every three years (Plate III)

Often 40 or 50 ships—equal to a good-sized navy—tie up here at one time (Plate XIII)

Tilbury is the first dock one sees when sailing up the Thames. Its long landing stage forms a homeland gateway for people from Australia, New Zealand, India, China, and other eastern countries who land or embark here. Fast trains of the London, Midland and Scottish Railway touch the dock's edge and whisk passengers away to all parts of the Kingdom.

In the city, PLA has still more ware

houses. At its Butler Street building, I was shown 70 rooms full of Oriental carpets—enough to cover a farm of 120 acres!

People buy most carpets in June for wedding presents, said a man looking for moths. There were electric ovens too for conditioning raw silk, a mountain of Havana cigars, and leaf tobacco enough to last one man 50, 500,000 years!

Here is a future horde of lean black cats to help out the official human ratcatchers.

Musty wine vaults use 28 miles of underground track on which to roll barrels that hold the 12,000,000 gallons of wine brought to London each year. Most of it is port and sherry, said an old gauger who has worked there 41 years. Some of the oldest was here when I came.

AN IVORY AND TOOTH MARKET

This is the world's ivory and tooth market (page 9). It takes 16,000,000 artificial teeth from the United States every year—and some 2,000 elephant tusks from Africa and Asia.

Not many tusks are from newly slain elephants, said a warehouse guard. Most of them come from mudholes left by animals long dead. Sometimes we get the ice-preserved tusks of Siberian mammoths as well as narwhal tusks and hippopotamus teeth.

That pile there is rhino horns, they're not ivory—just compressed hair. Chinese usually buy them for medicine, but when the Italians were invading Ethiopia agents came from Emperor Haile Selassie to buy these rhino horns. They wanted them to make courage-giving medicine for their warriors. They bid the price up so high that the Chinese dropped out of the market. But apparently the medicine wouldn't work in Abyssinia!

Wool was England's chief export in the Middle Ages. Today it is one of London's main imports. It takes the fleeces from about fifty million sheep to meet London's annual demands!

Tea trade has centered here for 300 years. In Mincing Lane you can see brokers bidding on lots which have been expertly sampled by PLA's own teatasters (page 13). I went in bareheaded, slipped into an empty seat and watched bidding—which absorbs 500,000,000 pounds of tea a year.

When they 'bulk' tea or mix it on some warehouse floors you may see it heaped up in mounds higher than men's heads.

Still in business in London is the successor of the firm that shipped tea to Boston for that historic party (page 11) (p. 53).

Spice rooms on the docks smell of Singapore pepper, Ceylon cinnamon, and cloves. Here experts gamble on sort nutmegs, kernels of a fruit of which mice is the huck. Perfume makers come here for tonka beans from Panama and civet cat serum packed in sealed cowhorns from Djibouti. I saw one chunk of ambergris worth \$5,000!

From the Matto Grosso (Brazil) come vanilla beans, specie, and sarsaparilla roots wound in bolls that look like brown twine, also aloes from Aden packed in dried monkey skins for the pill makers, from Mexico dried flies and lizard eggs as food for pet fish (page 28).

There was dragon's blood gum from Malaya used in dyes and 90 tons of African ostrich feathers worth \$25 a pound. In one big vault were stacked 60 tons of small opium cubes, wrapped in red paper. Police guard it to see that none of the drug slips into unlawful channels.

Plenty of happy dreams in that pile, someone remarked.

I'm tired of the smell of it, said the guard. Even a taciturn customs chemist, boring little holes to take samples, admitted that some fresh air might do him good. I too felt relieved to get out of the hop room and up where men were weighing, dried turtle meat from Panama.

Think of all the 'liquid history' that has been packed into this ancient water front since Roman galleys traded here since Danes and Vikings came to plunder, since the great companies of merchant adventurers launched their tiny ships for daring trade and colonizing far over then little-known seas.

Think of the 60,000 ships a year that now form smoke lanes from London to every nook of the world where goods can be bought or sold, and you begin to see why this 70-mile stretch of London River is incomparably, the world's busiest water front.

LONDON'S BIGGEST BUILDING BOOM

Not even London's growth after the Great Fire can compare with today's swift significant changes. More than 600,000 new homes besides square miles of flats have been built in recent years to house people taken from slums, crowded sections and from areas cleared for parks, factories or new streets.



Photograph by Maynard Owen Williams
 FLEET STREET, CENTER OF BRITISH NEWS LEADS PAST THE GLISTENING BLACK GLASS
 HOME OF THE DAILY EXPRESS TOWARD ST PAULS

Double-decker buses roll along the thoroughfare to the Parish Church of the British Empire where Nelson Wellington and other famous heroes rest. More news words are written bought sold received and dispatched in Fleet Street than in any other equal area. Each year the Western World obtains more than 22 000 000 words by radio cable and mail from London (page 25)



Photograph by B. Anthony Stewart

ONE OF BRITAIN'S "SAFETY VALVES" BLOWS OFF STEAM IN HYDE PARK

For years London crowds have flocked to hear soap box orators in this open air forum. On taxes, tariffs, politics, religion, war, peace, work, wages, speech is free and no proper theme is barred. Hecklers may heckle, but if speakers are molested or abuse their privilege, watchful bobbies gently intervene (page 12)

Historic Metropole Hotel served its last supper the week I reached London. Sad-faced waiters closed its doors forever. Now famous Adelphi Terrace is being torn down, even as Hotel Cecil melted into scrap.

As ancient city landmarks fade, queer modernistic structures, bewildering to Londoners returning after long absence, rise in their place. Look at that big cube of metal and glistening black glass which holds Lord Beaverbrook's *Daily Express* in Fleet Street (page 5), or the classic stone temple of the British Broadcasting Corporation (pages 27 and 32).

Or at Shell Mex House on the Strand, Bush House in Aldwych, and all the monster new piles raised here as official headquarters by Canada, Australia, South Africa, and other members of the British Commonwealth—whose show windows display the products of these far-away lands. They seem unreal, out of place, in this long static, smoke stained, weather beaten old town.

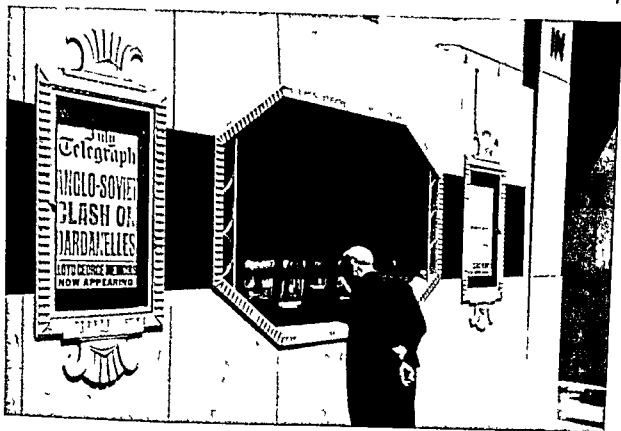
Rise of new suburbs is no less astonishing. "Satellite" towns, dormitories of 50,000 or more, spring up where yesterday

lay green fields and truck gardens. Smoky forms of new factories rim the horizon.

Middlesex County, men say, will soon be wholly urban. Steadily the city unfolds down through Surrey. Southeast towards the hop fields of Kent "ribbon towns" sprawl beside the highways, in Essex and Hertfordshire, "the scaffold poles of the builder are like wands that conjure new towns out of the ground" (page 50).

Drawn by this boom, industry tends to shift here from the less prosperous North. Workers flock along, each year London adds a young city to its population, and each day 100,000 visitors pass through its streets. In one week, at Regent Palace Hotel, 40 different nationalities filled out the police form. Yet you see few idle men. Munition works run day and night, 40,000,000 gas masks are being made—even every child is to have one, flying field schools turn out more and more pilots.

To learn how London, growing so fast, handles its passengers, I went to "London Transport" headquarters, a system which hauls a crowd each year equal to twice all the tabulated people on earth.



Photograph by B. Anthony Stewart

NEWS PHOTOGRAPHS, BEHIND 'INVISIBLE GLASS,' INTEREST PASSERS BY IN FLEET STREET

From this newspaper center great London dailies often send photographers by special plane to picture distant events. Day and night cameramen dash about the city in motorcycle sidecars, chasing story shots. Nearly one million news pictures are marketed here annually.

This greatest of all urban transport systems was formed under the Passenger Transport Act of 1933. Its Board has issued more than half a billion dollars' worth of stock. Listed on the Exchange, it is an example of the British public utility sponsored by Government, yet owned by private stockholders.

EVERY DAY LONDON PEOPLE TAKE
10,000,000 RIDES

The genius who guides the London Transport Board is Lord Ashfield. Born Albert Henry Stanley, at Derby, England, Lord Ashfield came to America as a child, he grew up here, attained high posts in Detroit and New Jersey traffic systems, and then went to London as head of its Underground Electric Railways Company.

"When I returned to London," he said, "I found many competing lines. When we finally organized London Transport we took over some 157 different bus, omnibus, tram, and railway lines—some owned privately, some by the city."

"What was your chief handicap?"

"Time," said Lord Ashfield. "It took 27 years to develop the present system."

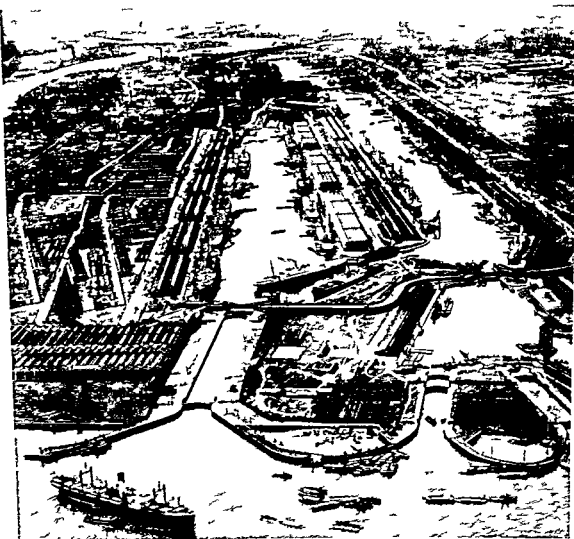
"Is it complete?"

"By no means. Working with Main Line railway companies, we are beginning a five year program that will cost £40,000,000. Also, we need more tube railways. Our vehicles, though modern as any, are not perfect."

"Centuries ago men could build beautiful bridges and houses, but even 20 years ago bus bodies were ugly and clumsy. They were still influenced by the shape of horse drawn vehicles, our only pattern. The difference between our latest Diesel driven, double decked bus and the char a banc of a decade ago hints at what progress can be made. (Plate V)."

"I see so many horses here pulling trucks. Do you use any?"

"None. The horse is a costly animal in any city—if you consider his slow pace, the amount of road space he occupies, and the congestion he causes. What we must aim at is a higher average speed upon the streets, to obtain their maximum use."



Photograph from Port of London Authority

THE WORLD'S GREATEST WET DOCK SYSTEM LINES THE THAMES FOR MILES

In such basins the water level is kept constant by means of locks. With a snorting tug at her head a freighter in Gallions Reach maneuvers before the gate leading to the King George V Dock (left) where a fleet of vessels is already berthed. The Victoria and Albert Docks (right) extend nearly three miles and are lined with vast warehouses for tobacco, grain, meat, and other commodities that the world ships to England.

Londoners have a deep affection for their buses. They grow up to respect the conductor for his courtesy, efficiency, good temper, and wit. I saw many visitors hold out handfuls of pennies, trusting the conductor to pick out the right fare.

THE JOYS OF BUS RIDING

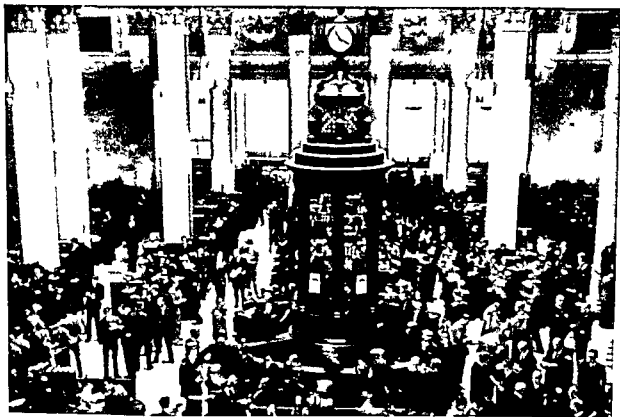
Here the joy of a sight-seeing ride on a bus never stales. London played skillfully on human nature when she sent buses to France with British troops in the World War.

These gay red vehicles or scarlet galleons bore London's familiar advertisements right up to the front line.

There is no less romance underground than above. It is easy to imagine the relationship between the motorbus of 1936 and the first wheeled vehicles made by shaping logs that rumbled along prehistoric roads.

But the Underground is a triumph of mechanization, an uncompromisingly of today. The automatic ticket vending and change-giving machines, the fast-moving escalators, the air-operated car doors, and the automatic signaling which enables forty 8-car trains an hour to travel on some lines—these wonders cannot be taken for granted even if they are mechanical.

Only by keen study of human nature



LLOYD'S WILL INSURE ANYTHING—FROM BALLOONS TO DANCERS' FEET

Under the clock in the main hall hangs the Lutine Bell recovered long ago from a sunken British treasure ship. The bell is rung by a clerk to announce a wreck or the arrival of an overdue vessel or to attract the attention of the brokers. Policies are written by individual members not by the corporation (page 31)



Photograph by B. Anthony Stewart
ALL THINGS COME TO LONDON'S DOCKS EVEN TONS OF ELEPHANT TUSKS

Most of them are from animals long dead, comparatively few from newly killed elephants. A warehouse guard told the author (page 4): "These long curving spikes of precious ivory taller than a man are carved into all manner of tiny delicate articles in near by London shops where craftsmen sometimes postpone their work until after midnight to avoid the vibration of traffic."



© AP from Pictures Inc

**KING GEORGE VI, AS DUKE OF YORK, RIDES TO ST PAUL'S CATHEDRAL FOR THE
1935 SILVER JUBILEE OF HIS FATHER, KING GEORGE V**

At the King's left is seated Queen Elizabeth then Duchess of York, who was before her marriage in 1923 Lady Elizabeth Bowes-Lyon. The little girl in the left foreground waving her hand is Princess Elizabeth Alexandra Mary the King's elder daughter and next in line of succession to the throne. Beside her is her younger sister, Princess Margaret Rose. Perched stiffly erect behind this old-fashioned coach uniformed footmen add a traditional touch to the royal scene.

can the Underground carry its 1,750,000 passengers a day. Consider the escalators. If people walk, or run up an escalator instead of standing still, its capacity rises by as much as 40 per cent. Therefore each escalator is run at a speed designed to keep people walking. The 137 moving stairways used here travel more than 2,500 miles a day—enough to form a narrow bridge full of people stretching almost across the Atlantic!

Ticket selling machines present another problem in psychology. The extent to which they are used depends upon their situation—a remoteness of a few feet may discourage purchasers. In a year the Underground sells 350 tons of tickets! And on busy week-ends its riders spend thirty tons of copper and ten tons of silver.

'What about the future? I asked Lord Ashfield

"Apart from new lines, signaling will be improved and platforms will be lengthened so that in time probably all lines may carry forty 8-car trains an hour during peak periods. We now use the Metadyne system of control, which enables faster and smoother acceleration and better braking. We have also reduced noises in the tubes."

"Some 1,200 Diesel driven buses are in service and eventually all will be of that type."

Can you reduce traffic jams?

"Certainly we can't let them get any worse! Even now, ours are not so bad as New York's, because we have no sudden crowds dumped at closing time from skyscrapers that house 10,000 or more people. But London urgently needs some bold street widening and some stagger plan by which all people going to and from work will not travel at the same time."



© Donald M. Leish

LORD NELSON HAS WATCHED A CENTURY OF LONDON LIFE SWIRL PAST TRAFALGAR SQUARE

Second only to Hyde Park as a gathering place for political demonstrations is this wide plaza laid out in honor of that doughty British sea fighter and his victory over the French and Spanish at Trafalgar. Atop the lofty granite Nelson Column, guarded by its four huge Landseer lions, stands a thrice life-size statue of the hero, mortally wounded by a French sharpshooter during the battle in 1805. Beyond appears the long façade of the National Gallery.



Photograph by Acme

FOR ONCE LONDON'S POLICEMEN GET COLD FEET

On one of the hottest days of last June these Port of London Authority police tested new life saving equipment. Wearing full uniform minus shoes and socks the bobbies donned uninkable jackets and jumped in. The nearest caught by the camera's quick eye seems to be walking on water.

For eight weeks I walked these kaleidoscopic streets, vivid with life's drama and tragedy.*

'Old Kate,' the match seller, had her pitch near my hotel. In sunshine or rain, there she sat, facing the Gaiety Theater where long ago, when she was a famous American star, the lights had flashed her name. Now, weeks later, come the London papers saying 'Old Kate is Dead. Once Famous Stage Favorite—Who Squandered

* See "Some Forgotten Corners of London" by Harold Donaldson Eberlein, NATIONAL GEOGRAPHIC MAGAZINE, February 1932.

Three Fortunes—Leaves Only £2, in Pennies She Will Be Buried in Tooting Tomorrow."

By Piccadilly curb stands an old Louisiana negro, singing Stephen Foster ballads.

"Uncle, why don't you go home?"

"It's a long ways back to the canefields, and I'm old. I was a cook on Atlantic freighters, got torpedoed and hurt in a wreck in the war, off in the Holland. The English people brought me here. I get by, singing."

He took my pennies and bowed, and began to sing "Old Black Joe."

'Let's go out to Hyde Park Sunday morning and hear the soapbox orators," a friend said (page 6).

Imagine my astonishment to see there in hilarious

harangue, an American newspaper man with whom I worked years ago on a Western daily.

"I just couldn't let the previous speaker's claims go unchallenged," he later explained. "So when he quit, I jumped up on his stand and commenced. I made the crowd laugh—and laughed with them."

"My opponent took me aside, when I'd finished and warned me not to ruin this Hyde Park business by making a joke of it. 'It's our art,' he said, 'and we take it seriously. You laughed too much!'"

One speaker described America as a

happy land where idle men get free lunches in bars, free shaves in barber schools, free newspapers in public libraries, and all go to Florida to get free warmth in winter—and where women have all control of men's wages, and run the country!

Another old man I listened to had been speaking here, on the League of Nations, so often that now hecklers knew his sentences by heart; whenever he began a line, they'd say it with him, like church responses, in owlish solemnity!

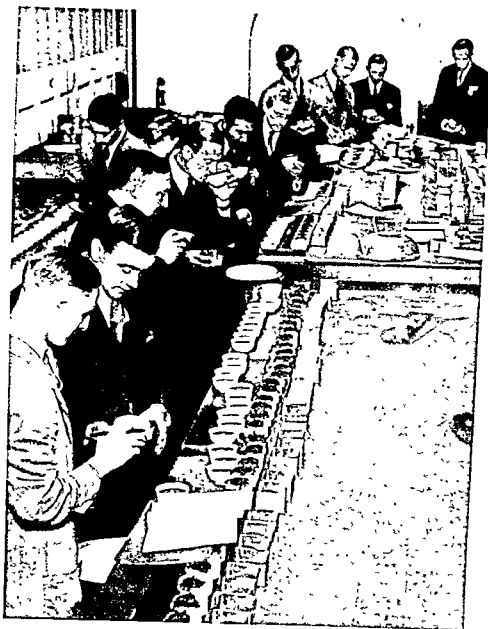
But police arrest hecklers who get abusive. One shouted to a speaker, "You're dead! Why don't you fall down?" A bobby led the heckler away.

On a passing bus a sign reads, "If you can't laugh at *Punch*, there's something wrong, but not with *Punch*."

"Houdini the Second" with the aid of a helper is wrapped in big chains and then padlocked, only to escape miraculously.

"Look!" he shouts, holding up a yellow receipt. "Yesterday the police got me for blocking traffic and I was fined a pound. Now I need cash to eat! Please don't all throw pennies; somebody throw a little silver!"

With the greatest of ease a versatile painter on a bicycle wobbles his way



© Fox Photos

IT'S ALWAYS TEATIME FOR TASTERS IN THIS LONDON WAREHOUSE

To arrive at suitable blends and to fix prices, teas from various countries and plantations are "tasted," but seldom swallowed. At Shanghai the writer knew an American "chazee," or teataster, who claimed to be able, with eyes shut, to taste any Chinese variety and tell the district from which it came and the season when grown.

through Piccadilly traffic, carrying a long ladder and a bucket of paint, and smoking his pipe as he rides!

In that seething bazaar which is Woolworth's sounds the babble of innumerable tongues.

"Will you have tea at half time?" ask theater ushers, meaning at intermission. Say yes, and they bring it, passing the tray along to you over other people's laps.

From the Adelphi stage door trips a

dancing girl in pajamas, sandals and her toes red painted mincing across Maiden Lane for a "spot of tea" between acts. More giggling chorines loiter about the stage door, ignored by blase pedestrians who prefer to stare at stuffed New Zealand birds shown in a near by window.

"I served my apprenticeship in the New York theaters," said C. B. Cochran, famous London producer. "For years I played the American cities with Richard Mansfield. Your *GEOGRAPHIC* is my favorite. Every time you publish pictures of San Francisco, Chicago, or Pittsburgh, it brings back familiar scenes."

Sitting in a Maiden Lane cafe behind the theater, we counted noses: a Bombay merchant, two Argentine cattlemen, a Netherlands tulip salesman, the agent for a French brandy, a British Army man on furlough from India, and the publisher of a Pacific coast newspaper. From there I went to meet a modelmaker, just leaving for Capetown to exhibit a miniature model of the Port of London and all its docks (page 2).

"I wish you could see the big mosquito I made," he said. "It was six feet across—for use in an African educational campaign against fever."

Turtle oil removes wrinkles, insists a sandwich man while street gamins before a movie house sing, "Git Along, Little Dogie." Cockneys adore Wild West pictures.

Yes, our police *do* use their heads! agreed an inspector. Lately we sent out a squad to keep order where an agitator was trying to excite a crowd. With them they took a football, a clever dodge and began to kick it about the park where the agitator talked. His listeners began to drop away to watch the police play football. Come on and play, challenged the police, and the crowd came and formed a team and played against the police. And so faded one more threatened incident.

ALL LONDON PATIENTLY 'FORMS A LINE'

A Saturday noon High Street bus queue was 200 yards long, three or four abreast. Thus in orderly patience, you see London trained to wait in line, no crowding, no cutting in at ticket windows and bus stops. Cars drive to the left of course. It is only pedestrians who swarm in curious disorder.

Walk any crowded street and you feel that all London is plunging straight at you.

Nobody instinctively keeps either to right or left. Morning millions scurry to work, pouring from bridges, tunnels, buses, and trains. After weeks of watching, your most vivid memory is of millions of little business girls running—all running to work.

Ask directions here and people do not say, "Across the street," they say, "Over the road." You do not "turn to the left," you "take the left turning." Odd street names abound, such as Haunch of Venison, Rabbit Row, Shoe Lane, Vining Lane, St. Mary the Axe, Wood, Bread, and Milk Streets, Honey Lane, Roman Bath Street, Lime Street, and Gutter Lane, with Ironmonger and Petticoat and Fetter Lanes.*

You see all men lifting their hats when they pass the Cenotaph in Whitehall.

While you talk with the Lord Mayor in his red robes, his old style carriage and four, with drivers and footmen in white wigs, draws up before the door to take him to open the Courts†.

Before the Mansion House a soldier demonstrates an anti-aircraft gun, while another pleads for recruits. Beneath its routine hurly burly, all London is uneasy. Thoughts of war and bombs are with it always. They still point out where World War bombs were dropped (page 36).

Drums, bugles, bells and tramping feet sound everywhere. Bells of St. Paul's peal merrily for weddings that unite ancient families. Royal Horse Guards in white breeches and high black boots cross sabers over the heads of bridal pairs while crowds cheer.

Handbells at St. Clement Danes Church in the Strand are played by children on a day in spring when by ancient rite, Danish children present an orange and a lemon to other youngsters who attend. They call it Oranges and Lemons Day, and quote an old rhyme:

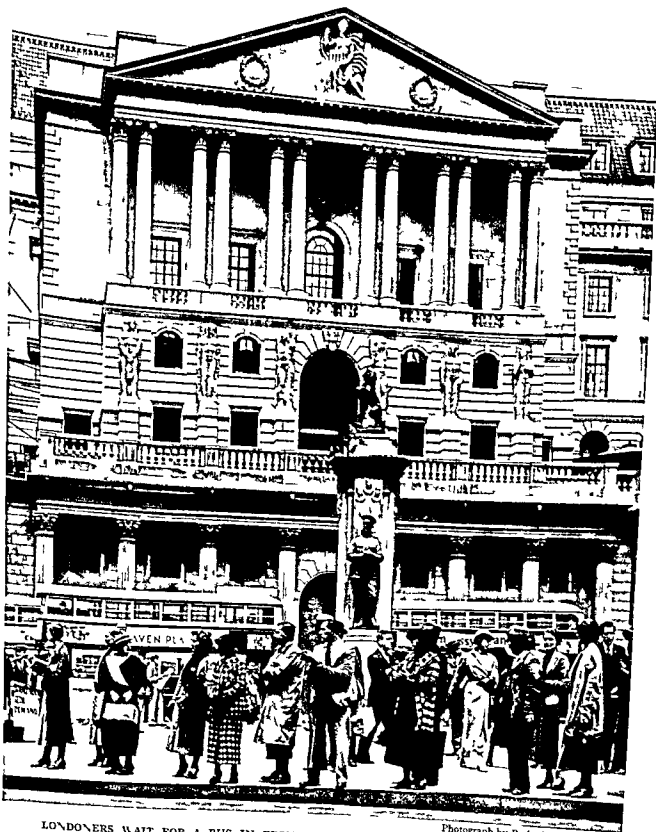
Oranges and lemons,
Say the bells of St. Clements

Two life-sized mechanical men wiggle their heads and raise their clubs to strike the hour on the bell of St. Dunstan's Church in Fleet Street.

Before Ye Olde Cock Tavern—founded

* See "London From a Bus Top" by Herbert Corey, *NATIONAL GEOGRAPHIC MAGAZINE*, May 1926, and "Aababonding in England" by John McWilliam, March 1934.

† See "Great Britain on Parade" by Maynard Owen Williams, *NATIONAL GEOGRAPHIC MAGAZINE*, August 1935.



Photograph by B. Anthony Stewart

LONDONERS WAIT FOR A BUS IN FRONT OF THE BANK, 'FISCAL AGENT FOR THE
BRITISH COMMONWEALTH

Though the Bank of England's home has been enlarged and modernized in recent years the ground floor is still without windows. Even high officials to enter or depart after hours must give the password used by the soldiers who guard the building at night (page 51). Vaults are shown only to official visitors. English paper money is manufactured under the supervision of The Bank.

in 1549," a gray and aging dog strains a bleared eye at the mechanical men, then waddles back inside to beg mutton bones. Playful guests squirt seltzer water on his nose—an old joke of which even he seems never to tire.

"What are those odd tin cats for, with their glass eyes and wobbly tails?"

"Scarecrows," says the clerk. "Hang 'em on a string, the wind swings them, the sun makes their eyes glisten. That scares birds and rabbits out of your garden."

A big "L" on a motorcar means the driver is learning, it warns others to give him plenty of room.

Said a hotel stenographer: "Curious people pass through this big town. One famous scientist dictated a serious paper to me on a formula for eternal youth. Another client, who flew the Atlantic in the Zeppelin and spent a fortune on horses here, left town forgetting to pay my bill of a few shillings."

Outside a mosque is a card inviting the public to come in and get acquainted with the Moslem faith.

Walk any street and you meet men holding out their caps. Outright beggars are arrested, so mendicants always "sell" something. One wanted pennies for pictures chalked on the pavement.

"They are good," I said. "Where did you learn?"

"Not mine," he answered. "I collect for the artist, who has gone to the movies."

STYLE KNOWS NO FRONTIERS

American-made women's frocks hang in Selfridge's windows. "Style and price that's all," said Mr. Selfridge. "We send buyers to New York to watch for new frocks, handbags, anything new. Style is international. It breaks out anywhere."

"Lately, in Paris, the world's leading dressmaker died. No successor to him has appeared. He may turn up again in Paris or here in London or over in New York. New style is anything that catches on."

"When you introduced department store ideas to London years ago," I asked, "what was your big problem?"

"I had plenty. Money was one. In Chicago as partner of Marshall Field, if I wanted \$100,000 to try out a new idea I had only to ask for it. Over here on my own I had to raise the cash myself. Then there was public opinion. At first people were disposed to look down on retailers

Today this feeling is much changed. The retail merchant is respected, as he ought to be."

"In recent years retailing has developed into a vast industry, with lots of other fine big stores. This has put 600,000 additional clerks to work here. Strangely enough this just about coincides with the total number of men who have been forced into idleness by the decline of coal mining."

"Do you employ many Americans?"

"No, they get homesick."

Then, wearing his high silk hat, like merchants of old, he hurried away on his daily trip through the big store.

FOR LUXURY LONDON PAYS HIGH PRICES

Wealth here is incalculable. There is no end to luxurious clubs, mansions, sumptuous palaces of government, lavish hotels, and high priced shops.

In New Bond Street you can pay \$1.50 for a cigarette lighter, but in Whitechapel you can buy one that works for 25 cents.

Grapes, peaches, melons, grown in steam heat under glass, sell at a fruit stand near the Ritz for incredible prices. I saw straw berries there, each berry wrapped separately in cotton at \$3.75 per box of 12! Cantaloupes at \$5 each! At that price, fifty were just being packed for delivery to the Mansion House.

"When very scarce, we get as much as three guineas each for melons," said a clerk. \$15.39!

Just around the corner, of course, may be a street peddler with bananas at two or three cents each—and good grapes at six pence a small bunch.

In New Bond Street, plover eggs, per adventure even gull eggs masquerading as plover fruit—at 35 or 40 cents each.

In Limehouse, a dish of stewed eels and a glass of beer at 10 cents.

Go to Petticoat Lane on Sunday morning and you can see clothes sold at auction. A boy steps up to try on a new suit. Spectators crowd about to discuss its fit and urge the boy to take this or that coat—or pants. Women buy new dresses at auction for 75 cents, and up, while husbands skeptically look on.

Exclusive tailors of Savile Row work behind stained glass windows, disdaining to expose even their rolls of cloth—much less a vulgar signboard.

You ponder all this as you go off to hunt the tomb of Captain John Smith.



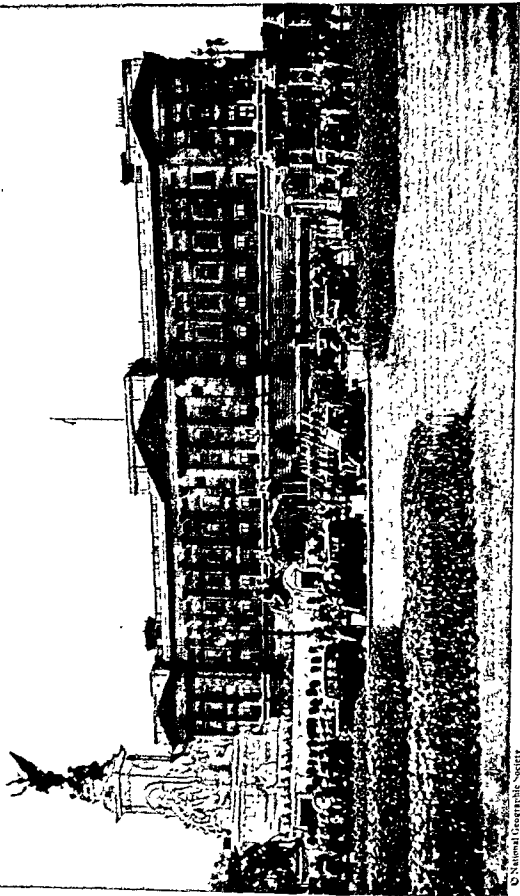
YEOMEN OF THE GUARD WEAR TALL BLACK BUSBIES OFTEN CALLED BEARSKINS
The proclamation announcing the accession to the throne of King Edward VIII was read at St James's and here the new King lived for several months thereafter (Plate II)



© National Geographic Society

Fulay Photographs by D. Anthony Stewart

FLAWLESS HORSEMANSHIP MARKS THE DAILY MOUNTING OF THE GUARD
Stalwart Life Guards replace a retiring detachment in a colorful ceremony on the Whitehall side of the Horse Guards a building now used as military headquarters for the London district (Plate V)



© National Geographic Society

IT'S DRUMS, DRUMS, DRUMS, AND MARCHING FEET, WHEN GUARDS ARE RELIEVED AT BUCKINGHAM PALACE.

Finlay Photograph by R. Anthony Stewart

Originally built during the reign of James I, the London residence of the King, at the west end of St. James's Park, frequently has been altered and changed at Buckingham Palace.

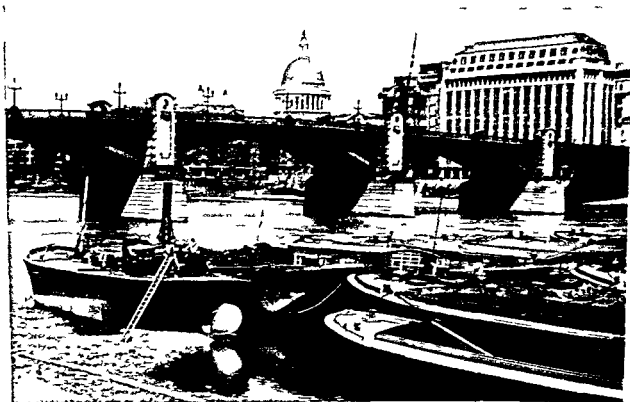


© National Geographic Society

R'D COATLD BEFEATERS STAND AT SALUTE BEFORE THE TOWER OF LONDON

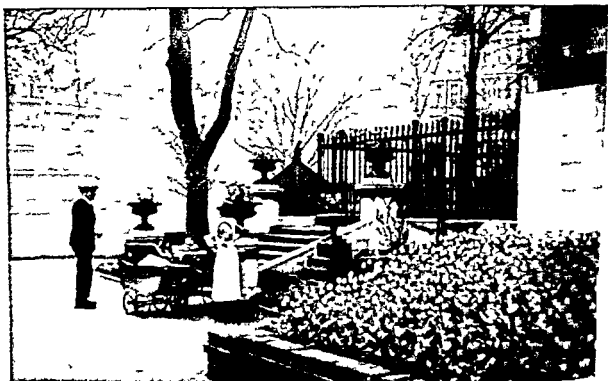
In the triennial Beating the Bounds of the Tower Liberties the Constable leads a procession of Yeomen Warders or Beefeaters around the Tower grounds. Spectators carry switches which commemorate the ancient custom of whipping a small boy at each marker to teach him and the citizenry to respect boundaries. At the extreme left stands the Yeoman Gaoler. In former times the edge of his ax when directed toward a prisoner returning from trial indicated that he was condemned to death.

Enslay Photograph by B. Anthony Stewart



ABOVE SOUTHWARK BRIDGE LOOMS THE MASSIVE DOME OF ST. PAUL'S

London's most conspicuous building, St. Paul's Cathedral, is often called 'the parish church of the British Empire.' Barges temporarily stranded by low tide are a few of some 9,000 such craft that handle freight to and from ships' sides on the Thames.



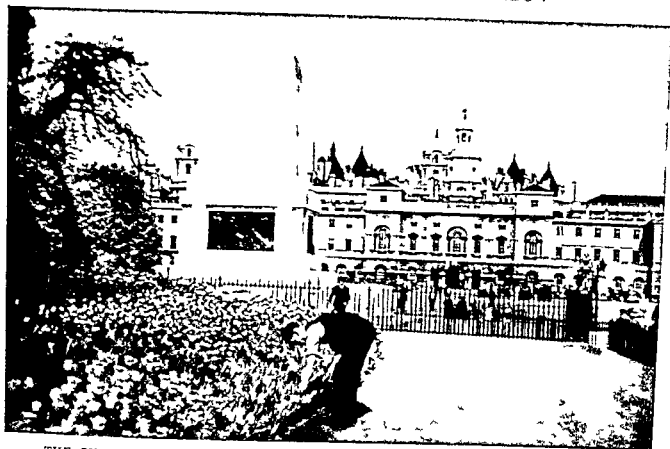
© National Geographic Society

Finlay Photographs by E. Anthony Stewart

INNER TEMPLE GARDENS: A SERENE RETREAT FROM BUSY LONDON STREETS

Only a step from the bustle of Fleet Street are the serenely beautiful and quiet courtyards of the Temple, comprising the Inner and the Middle Temple where Englishmen study and practice law.

THE POMP AND PULS OF MODERN LONDON



THE GUARDS WAR MEMORIAL OVERLOOKS FLOWER-DECKED ST JAMES'S PARK

Henry VIII drained a swamp to make the deer park that later became St James's Park. Between the memorial and the Horse Guards building (in the background) stretches Horse Guards Parade, scene of the Trooping of the Colour on the King's birthday.

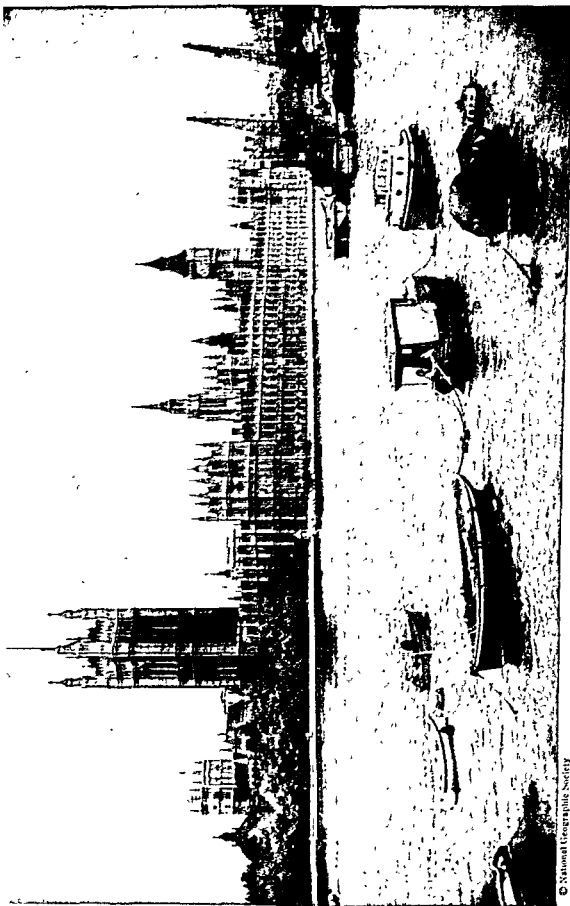


© National Geographic Society

GLEAMING NEW DOUBLE DECKERS JAM PICCADILLY

Flay Photographs by B. Anthony Stewart

The outsides of myriad London buses are placarded with advertising. Piccadilly is named after a prosperous tailor who made pickadills (lace ruffs worn in early Stuart times).

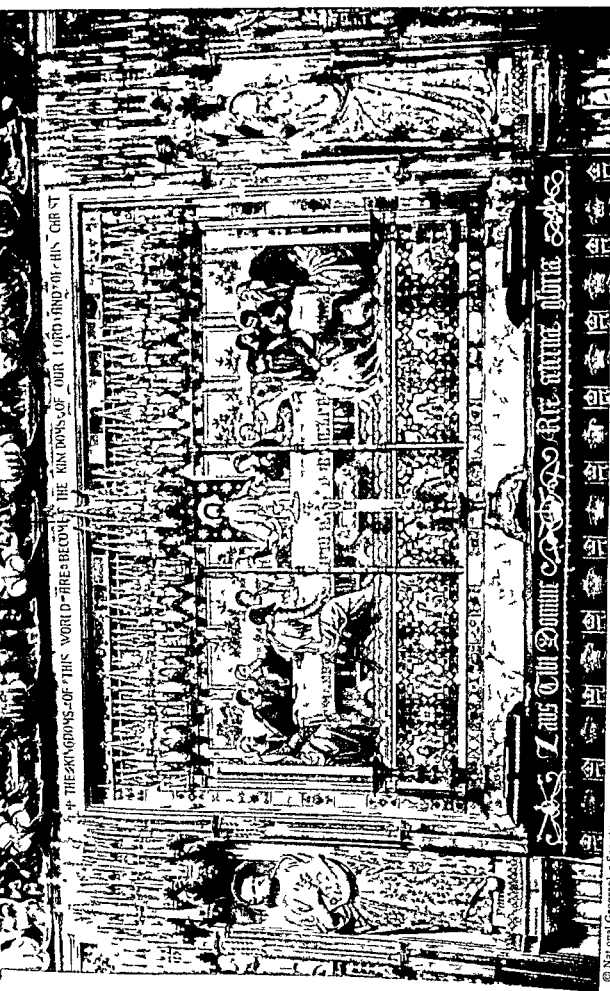


© National Geographic Society

HEART OF AN EMPIRE.—THE THAMES-SIDE HOUSES OF PARLIAMENT

Finlay Photograph by R. Anthony Stewart

The Gothic edifice covers 8 acres and contains 11 courtyards, 100 staircases, 500 apartments, more than 700 monuments, and 2 miles of corridors. Here are the sumptuous House of Lords and the comparatively plain House of Commons. Familiar Big Ben strikes the hours from the Clock Tower. Since Guy Fawkes's plot to blow up the Houses in 1605, Beekeepers from the Tower of London search the building on the eve of Parliament's opening.

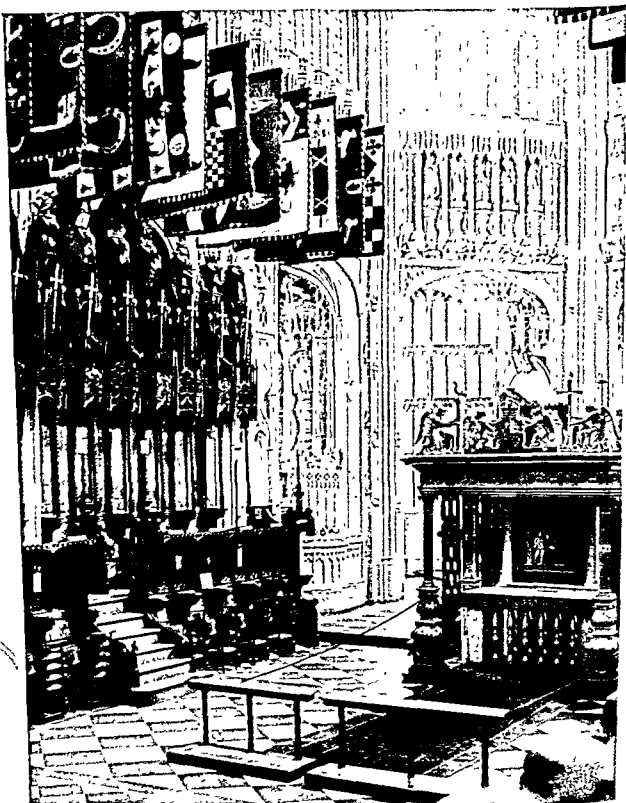


© National Geographic Society

THE LAST SUPPER IN MOSAIC ENRICHES THE HIGH ALTAR OF WESTMINSTER ABBEY

Fluor Photography by B. Anthony Stewart

Venetian glass wrought into a familiar composition in mosaic glows among surrounding carvings like jewels in a richly chased ring. Within the altar is English sovereigns have been crowned since the Norman Conquest. The Abbey is crowded with the tombs and monuments of many of Great Britain's Kings and Queens and of outstanding lords and ladies, statesmen, musicians, engineers, architects, bards, and writers. Especially popular with visitors is the Poets' Corner in the south transept.



© National Geographic Society

Finlay Photograph by E. Anthony Stewart

A SHRINE OF CARVED STONE AND WOOD IS HENRY VII'S CHAPEL

This chapel is generally considered the most magnificent part of Westminster Abbey. Widely famed are its doors of bronze-plated oak, its sculptured saints, and its fan-tracery ceiling. The carved oak choir stalls are assigned to the Knights of the Bath. Above each hang the sword, the helmet, and the banner of the incumbent knight.

In the midnight brilliance of Piccadilly stands a hansom cab "London's last," says a policeman

We rode in the old cab down Piccadilly and into the Strand just as theaters disgorged their crowds. Even the policemen smiled, people whistled, and a boy yelled that we had "just come off the Ark."

"I've known that old cabman for 40 years," said my hotel doorman. "He has driven many famous people, even the Sultan of Turkey."

Titled ladies in tiaras and silver slippers, coming from the opera, lifted silk skirts to steer past onion crates of Covent Garden Market (page 50). The theater stands in the old market, amid mingled smells where, in early morning, shouts of fruit and vegetable dealers instead of opera stars' voices fill the foggy air.

Confused tongues chatter in these noisy streets. Pretending to speak no English, a polyglot reporter wrote of his lingual adventures. For a week he roamed London, using a different language each day. Yet no matter what tongue he chose, he soon found someone who understood, and gave him directions when he said he was lost.

Flocks of Dutch, French, or German school children, herded by teachers, meet here on holiday excursions.

Most visitors go to Westminster Abbey, the museums and parks, the Zoo, or to the Tower, with its Crown jewels, chapel, armor exhibits, and historic dungeons. Others seek the fustian of Hyde Park orators, or the japery of music halls like the Palladium, where you may see a clown borne high in air grasping the feet of a flying goose equipped with red tail lights. What you don't see is the hidden wire that swings them along!

THE ABBEY ATTRACTS MOST SIGHT SEERS

"Most popular with sight seers is the Abbey," said a Cook's guide. "Yes," agreed a verger there, who tried to sell me a piece of Maundy money lately distributed by the King. "But to most of them this Abbey is just a museum. I've seen excursion parties of 5,000 waiting at sunup for us to open the doors. Ask them if they'll stay for seconds and they say they're just looking around." (Plates VII and VIII.)

"Working here among the bones of the great, must inspire you with noble and solemn thoughts," I said to a porter dusting a marble queen.

"Right now," he said, "I'm thinking about lunch and beer."

Visitors seldom get far behind London scenes. Steadily thousands tramp the crowded British Museum aisles to marvel at the Elgin marbles, the Rosetta Stone, at all its millions of fascinating items. But few, except scholars, see such hidden treasures as the astonishing "Anglo Saxon Chronicle," kept under lock and key.

This curious Latin and Saxon script is set down in different handwritings through long periods. Part of it reads as follows: "A D 1 Octavianus reigned 56 years, and in the 42d year of his reign Christ was born."

"A D 2 The three astrologers came from the eastern parts . . . to worship Christ."

"A D 3 This year Herod died, having stabbed himself." And so forth.

FLEET STREET—A WORLD MARKET FOR WORDS

More writing goes on in Fleet Street and its side lanes than in any other equal area (page 5).

News gathering armies, such as Associated Press, Reuters, British United Press, International, British Press Association, and others, have busy staffs here. They buy and sell news, which is the record of change.

To this word mart news flows from every nook and cranny of the globe, it is carried by every means, from yak back to radio. Exported words flash from London across the Atlantic, some via Paris, at the rate of about 11,000,000 a year. As many more move by mail.

From the United States London buys only about one-tenth as many words as we take from her. From us she buys mostly market news, editorialized political dispatches, Hollywood gossip, the odd and the queer, sensational scandal, crime, and disaster. "We give our readers what they want," insist London editors, defensively. "One of our high priced men is kept at Hollywood," said Reuter's director, "because London wants news about movie actors."

Circulations are enormous, three of London's 21 morning papers print more than two million copies each, and circulate over the whole of the British Isles. Some weeklies, like the *People* and the *News of the World*, sell between three and four million copies each. London Sunday morning



Photograph from Topical Press

**BAREHEADED BROKERS AND NOISY MESSENGERS CROWD
THROGMORTON STREET**

After closing hours, members of the Stock Exchange often adjourn to the street and there carry on business. During a boom, the narrow thoroughfare is packed. Founded in 1773, the Exchange is nicknamed the "House" (page 40).

paper circulation has touched 18 to 20 million copies. Night and day huge trucks groan through Fleet Street, piled high with rolls of paper. London prints 357 different newspapers, weeklies, and monthlies, besides boatloads of books.

One night I watched them "put the *Times* to bed." When a bell rang at 11:30 o'clock, the presses started. Afterwards they served supper in their editorial cafe and took me to see their garden by moonlight, with its tree and tulips.

"Do you speak for the Government?" I asked.

"When it is right."

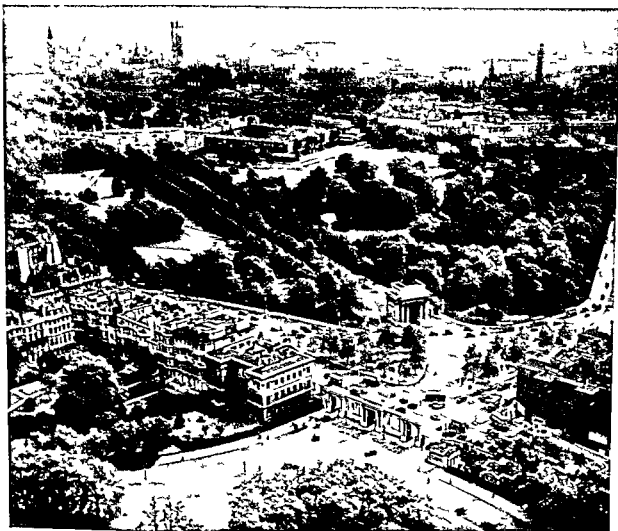
"Why print advertising all over your first page?"

"For revenue."

The first copy of the *Times*' latest edition is always sent by special messenger direct to the King, no matter where he may be. This is called "The Royal Edition." It is printed on extra-fine, durable paper.

London had newspapers long before the *Times*, but none has had a better name for integrity and careful writing. Every article in the *Times* is designed to bear the criticism of experts in that particular subject with which it deals, and yet interest the general reader.

As early as Sir Francis Drake's day, London had its news tracts, illustrated with



Photograph by Charles E. Brown

PRIVATE GARDENS SCREEN BUCKINGHAM PALACE FROM TEEMING HYDE PARK CORNER

The King's official London residence is the quadrangular building near the end of the tree lined avenue leading from Wellington Arch (right center). English sovereigns since Queen Victoria's accession have resided here. The royal standard is flown from the palace when the monarch is at home. In the distance (upper left) is the Clock Tower housing Big Ben (Plate II).

woodcuts, but its first real newspaper, printed fortnightly in English, in Amsterdam, delivered here, did not appear till 1620. Oddly enough, the first sentence in this first of all newspapers complained that there was no news, saying that the "latest tidings" had not yet arrived! Known as the *Coranto*, this first paper appeared about the time the Pilgrims landed.

At the London Press Club they show you a fascinating file of historic newspapers.

One veteran on the *Illustrated London News* gave me an old woodcut, made from an on-the-spot drawing of British soldiers camped on the Nile, when "Chinese Gordon" was fighting the Mahdi at Khartoum.

What a difference now, with photography! Enterprising London editors send cameramen by special airplane to points

as far away as Egypt and Palestine to get pictures for one big news story. Photographers race about London on motorcycles.

Radio news is chosen and broadcast under Government control.

"Does radio news injure newspapers?" I asked an editor.

"No. The printed word embalms and preserves the suspended thought—people like to read news—even to read about events they have already witnessed."

You must pay the equivalent of about \$3 a year license fee to own a radio in the Kingdom.

"BBC" is the popular name for the British Broadcasting Corporation, whose modernistic building stands in Portland Place (page 32).



WITH PROUD WIVES HELP AND THE FRIENDLY CRITICISM OF BYSTANDERS A WAITER TRIES ON A TAIL COAT IN CROWDED CALEDONIAN MARKET

Not even the Orient's jumbled bazaars hold more heterogeneous odds and ends than clutter this famous market of heds and open air bargain counters



Photographs by B. Anthony Stewart

AMID QUEER CARGO ON LONDON DOCKS WAS SEEN THIS DRIED MONKEY SKIN

Hemplike bales in the lower foreground are balls of South American sarsaparilla roots. Tracacanth gum, used by pharmacists, dragon's blood, or resin exuded by the fruit of a Malayan palm, ambergris from the Indian Ocean, rhinoceros horns, turtle shell, opium, and live vampire bats for a movie company—all these and other odd items move through the vast warehouses (page 4)

"Though the Government controls all political and other speeches that go on the air," said Sir Stephen Tallents, a director, "minorities enjoy adequate radio time for stating the opposition's views."

Besides programs radiated on long wave lengths for reception in the United Kingdom, B B C also sends out a 24 hour "Empire Program." Because of difference in time, this is so scheduled as to reach far off lands, like Australia and Jamaica, at convenient listening hours. "But it's tough to come on the air and try to be funny at six in the morning," complained a comedian.

News, music, plays, sporting events, speeches—all are broad-

cast. Public schools have radio sets, and receive regular lessons. For Welsh schools broadcasts go out in that language.

No advertising is allowed. The only radio talk of toothpaste or cigarettes London ever hears is that which is bootlegged by air from near by French stations.

One May night I heard the program closing with the solemn strokes of Big Ben. Suddenly a nightingale began to sing. For days, their 'mikes' set in the woods, radio men had been trying to catch that bird song, and now it broke in gloriously a few seconds before midnight!

* See the new map of The Pacific Ocean and accompanying miniature time clocks published as a supplement to the NATIONAL GEOGRAPHIC MAGAZINE for December, 1936



Photograph from Keystone

DUCKLINGS DO A GOOSE STEP BEFORE A SLIGHTLY SCANDALIZED BOBBY

It all happened on Croyed Road says the cameraman. Mother duck strayed from a neighboring estate, hatched her brood in a garage, and now in duckish dignity leads them home while traffic halts.

London is a colossal clearing house for mail. Larger Atlantic liners commonly carry from 12,000 to 20,000 bags. The record load to date, brought by the United States liner *Washington* to Plymouth in 1935, was 27,607 sacks—approximately 10,000,000 letters, besides newspapers and packages.

London's great G P O, or General Post Office, not only handles mails but also operates the telegraph, telephone, and radio services.

To see one phase of postal work, I rode the "Traveling Post Office"—that fast L M & S mail train of a dozen red coaches that rushes north every night to Scotland. "We missend only one letter in every 30,000," said a sorting clerk.



Photograph by B. Anthony Stewart

**"THIS MAN STOOD ON HIS HEAD SO LONG IT MADE OUR OWN NECKS ACHIE
TO WATCH HIM"**

When theatergoers 'queue up' to buy tickets, itinerant entertainers—like the jongleurs and troubadours of old—appear to play, sing or do tricks to catch pennies. This sidewalk performer seems to be ignored by the onlookers for whose comfort campstools are provided while they wait.

Every time we roared through some dim-lit country town, nameless to me, a man would dump off a bag of letters.

'How do you know the exact spot?' I asked.

"By sounds. I've made this run so often that I know the roar of every tunnel, every bridge, every crossing rattle."

Local bags, hanging ready beside the track, were swept up by the basketlike scoop and slammed in at us with fearful violence. "The other night we were running so fast that a heavy bag flew in hard enough to smash those sideboards in our car."

No wonder they pulled me to a safe corner as we neared a pick up!

"What would happen if you scooped up a stray cow?"

'It would break every bone in her body!'

Mail is extra heavy during the shooting season in Scotland, when guests swarm up that way.

Often official pouches carry odd items. "When a certain European queen was visiting up here," said a grinning clerk, "she

used to frank her laundry out every Monday—to be washed at home."

"ARE YOU THERE?"—TO THE WORLD

Much of the world makes its international telephone calls through London, except that North America and South America speak directly with each other. About 5,000 conversations a day pass between London and the Continent, most news dispatches come this way, for speed and more freedom from censorship.

In London's great world-wide "Central," I met young women operators who in quiet periods gossip with sister operators in Tokyo or Moscow.

Over the switchboards are painted the names of far away cities, each with a little lamp that glows to signal a call. These lamps seem to say, "If you want Berlin, Warsaw, or Geneva, here we are."

They let me test this service by introducing me, over the air, to telephone officials in widely separated Buenos Aires, Iceland, and India. Fortunately, to my own satisfaction, those who answered in Iceland



© Fox Photos

"THE STUFF THAT DREAMS ARE MADE OF!"

"I can't believe my eyes," the bus driver is probably muttering to himself as he squints through the rain at this 11-foot rubber giraffe. What's it for? Where's he taking it? Just another unsolved mystery of London streets!

and Argentina said they were members of the National Geographic Society

Though world wide talks are no longer a novelty, some hold odd qualities of humor and human interest. One London man refused to pay his bill after a long distance call to Australia.

"I proposed to my girl," he complained, "and she said 'No!' It was all because your service is so bad, I could hardly make myself heard."

"Try it again," urged the telephone people. "If the connection isn't better, there's no charge." He tried, and the Australian girl said "Yes!"

"Hold my new son up to the telephone, and let me hear him yell," said an excited American in London when the stork came to his home in the States. The nurse did, and over the far wastes of the Atlantic night came the new youngster's lusty cries.

Trying to clinch a potential telephone subscriber, a salesman said, as a special inducement, "We have now an easily remembered number, 1066, the date of the Battle of Hastings."

To which the harassed victim replied,

"Why not 1665, the date of the Great Plague?"

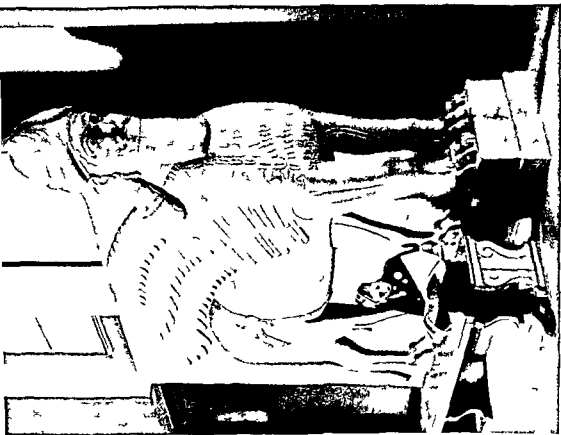
THE "BOXES" AND "WAITERS" OF LLOYD'S

Lloyd's is a name known everywhere. It stands for ships and insurance.

Because underwriters met merchants and captains in the 17th century at Edward Lloyd's Coffeehouse, the seats where the modern underwriters sit are called "boxes" and the red coated attendants "waiters" (page 9).

In the big hall of Lloyd's new structure on Leadenhall Street, where the old East India House used to stand, hangs the famous Lutine Bell. It was salvaged in 1853 from a treasure ship which sank off the coast of Holland in 1799. It is rung by a waiter to announce news concerning an overdue ship—once for a wreck, twice for an arrival. Underwriters and brokers cease their work to listen to its tidings.

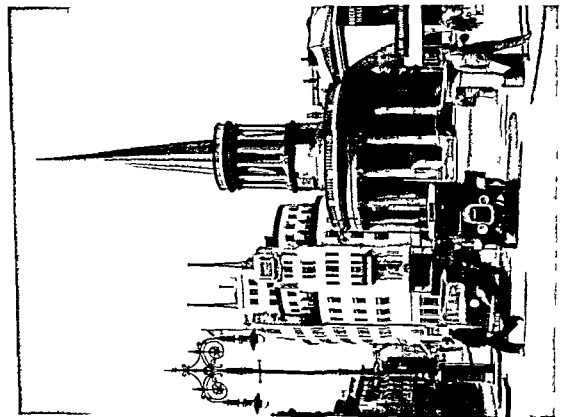
Lloyd's is not an insurance company, as many believe. It is simply a corporation with some 2,000 members grouped in syndicates and each "doing business on his own." These members include many men



Photographs by B. Anthony Stewart

MESSENGER AND WINGED LION—TWO FEET AND 3,000 YEARS APART

In this five legged monster with the features of an Assyrian king ancient sculptors combined the wisdom of a man with the strength of a lion and the speed of a bird. The British Museum's archeological exhibits are renowned throughout the world.



PERHAPS YOU HAVE CAUGHT BROADCASTS FROM THESE B B C TOWERS

London radio programs originate in the modernistic building whose masts loom above the spire of All Souls Church in Langham Place. A special chair was reserved for King Edward VIII who came to these studios for his Empire broadcasts. Broadcasting is controlled by the Government (page 27)



WOMEN MADE THEIR CURTSY TO KING EDWARD VIII SEATED IN A GILDED CHAIR AT A GARDEN RECEPTION AT BUCKINGHAM PALACE
 Previous to formal presentation ceremony in Court etiquette is given and often costumes must follow prescribed style The ladies must wait hours for their brief turn
 Photo by the World



Photograph by B. Anthony Stewart

NEARLY 100 YEARS' SERVICE IS THE COMBINED RECORD OF THESE TWO VETERAN PRINTERS

They have set type for news stories of such historic events as the battles of the Boer War, the earliest airplane flights, the World War, and many recent news events. Here they make up a form in the print shop of the *Illustrated London News*, popular weekly found in English speaking homes and clubs the world over. Long before photographic half tones were made, this paper sent artists far and wide to cover news events with pen and ink pictures (page 25)

distinguished in British public life who seldom go near Lloyd's themselves but are represented there by underwriting agents.

Until recent years Lloyd's was only a market for marine insurance. Today it goes far afield. The bulk of its policies are the usual kind, on ships, cargoes, policies against loss from fire, storms, strikes, etc.

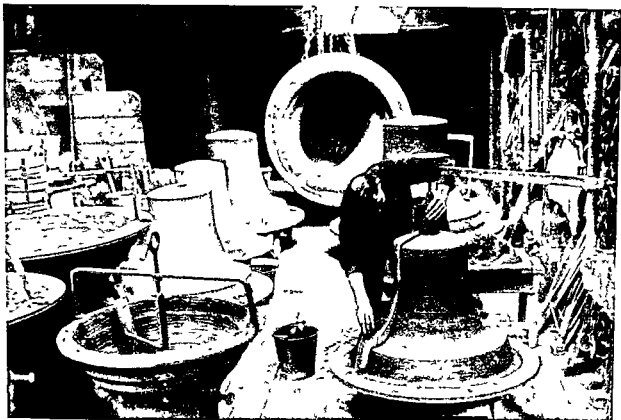
But it is the odd and queer policies which it also writes that make people talk so much about it. Insurance is issued, for example, to cover loss should a proposed wedding not take place. They insure a surgeon's or musician's hands, or the feet of a dancer. So many people here insure against having twins that printed forms are in use, called for almost daily!

Besides insurance, Lloyd's services to shipping are enormous. Ships' movements from all over the Seven Seas are reported here throughout the day by the 2,500 Lloyd's agents who are established all over the world. News of movements of ships, shipwrecks, and airplane crashes are posted on the board in an alcove. Fires, acci-

dents, earthquakes—all kinds of disasters that injure business—are telegraphed here. Major catastrophes are entered in the "Casualty Book," familiarly called the "Chamber of Horrors," indeed a doleful record.

In the great underwriting room of Lloyd's I found the broker who had insured the National Geographic Society-U. S. Army stratosphere balloon, gondola, scientific instruments, and lives of the flyers. They showed me a policy once issued on how long Napoleon Bonaparte might remain in power, also original letters of marque and reprisal, and a bill of fare from the ill-fated *Titanic*, carried away in the pocket of a passenger who was picked up in the Atlantic after that ship was lost.

Cables that pour in here to Lloyd's great "intelligence room" with news of world commerce and ships' movements are printed in *Lloyd's List* and *Shipping Gazette*, founded in 1734. This is the oldest newspaper in London, with the exception of the *London Gazette*.



Photograph by B. Anthony Stewart

BELLS WERE CAST IN THIS FOUNDRY IN THE DAYS OF "GOOD QUEEN BESS"

Here at the Whitechapel Bell Foundry, in 1858, was cast the 13½-ton Big Ben, whose tones have been broadcast by radio throughout the world. In preparing a mold, the craftsman sweeps the curved strickle board round and round to shape the loam-coated core. This is fitted into the outer mold, an iron case lined with loam (left), then metal is poured in. After cooling, the case is removed and the core knocked out, leaving a brand-new bell ready for finishing touches. One hangs by chains behind the man.

One queer method of selling ships at Lloyd's in the 18th century was by "inch of candle." Bidding started when the piece of candle was lit, and the last man to bid just before the candle sputtered out got the property.

It was during the South Sea Bubble scandals in 1720 that many wildcat insurance schemes started in London. Some of these included policies against death from gin, against lying, and one provided insurance of female chastity.

One service of Lloyd's, of which the general public seldom hears, has earned the gratitude of sailors. That has been Lloyd's work in developing lifeboats and in specifications for the safer building of ships. Lloyd's has always fought against such practices as overmanning, bad stowage, overloading, and the use of obsolete charts.

Lloyd's is the most cosmopolitan insurance exchange in the world and it is the world's center of marine information. During each hour of the day and night, the movements of every vessel under every

national flag reach Lloyd's; the news of every wreck and casualty is recorded.

London is the cradle of insurance. Life insurance especially grew up here. The work of its actuaries served as model for many other lands. London scatters her fire and marine insurance agents into every nook of the world. Premiums pour in here from everywhere, and from London huge sums have gone abroad to pay losses in historic fires.

THE HOME OF THE BEEF EATER

This is a carnivorous country.

Lunch any day at Simpson's-in-the-Strand, and you see cooks roll their serving wagons among the tables—wagons that fairly creak under giant chunks of sizzling roast beef. Guests tip the cook who skillfully cuts big slices with a swordlike knife.

Crowd into the tiny, ancient Cheshire Cheese in Fleet Street, overrun now with tourists buying souvenirs, and there's the rump steak, kidney, and Yorkshire pudding, just as served long ago to Dickens,



© AP from Pictures Inc

PREPAREDNESS—1937 STYLE

With Europe uneasy the British Government has ordered 40 million gas masks for the safety of the citizenry in time of war. Like a fanciful lady from Mars this girl steps from a mobile chamber at Hendon where she was taught how to adjust the new equipment. Britons vividly recall the horror of the air raids over London during the World War and some modern homes are provided with gas and bombproof chambers (page 14)

Sam Johnson, Tennyson, Goldsmith, and Thomas Hood. Over some benches are brass plates honoring such historic guests. "Our prize dish," said the manager, "is not a Yorkshire pudding but one made of steak, kidney, mushrooms, plovers, and spices, it is boiled at least 16 hours and weighs over 60 pounds."

When the pudding season opens in October, the Bishop of London, a cabinet minister, or a foreign ambassador comes to bless or formally cut the first one. Here the noisy bar is packed, at midday and

early evening, with barristers from near by mns, with Fleet Street journalists, with actors, poets, printers, painters, and vestrymen.

Here no habitue ever orders Scotch he simply says, 'Whiskey.' If he wants Irish whiskey he asks for "Cork," and gin is never just vulgar gin, but "rack."

For forty years a Rabelaisian parrot lived here, famed for its gift of army flavored invective. When it died the *Daily Telegraph* honored it with a lead article and a poem.

Simple qualities of old fashioned English cooking are not disguised, as in Paris, by fancy names and sauces. Unlike the French, the English do not feel that inventing a tasty new dish is more important to mankind than discovering a new

star. But somewhere in Soho or the West End the epicure may easily find any continental dish, be it Italian, French, German, or Greek. There are Indian restaurants, too, like Vereswamy's, where retired Army men go for curry and rice.

London has as great a variety of eating places as any world city—except Paris. You can easily find American hot cakes and corn on the cob. But when an Australian friend boasted that we could even walk into the Savoy and get kangaroo-tail soup for lunch, I dared him to try it.

"Yes," said the wary hotel chef, "but give us a little more notice"

HOW FOOD HABITS CHANGE

Dense populations of recent times have brought the rise of large industries which import vast amounts of food, prepare and distribute it. Conspicuous is the Lyons Company. It operates over 250 eating places, a string of hotels, employs 30,000 people, and uses nearly 2,000 trucks to deliver food (page 57)

"In the forty years of its life our pioneer cafe at 213 Piccadilly has fed over 35,000,000 people," said an official of this company. "Some guests, young men when we started, still dine with us

"We have seen changes in London's eating habits. During our first year, we served only 40 dishes of ice cream a day, now we sell as many as 3,000,000. Curiously, about 70 per cent of all our customers ask for vanilla flavor. When this fact was ferreted out by reporters, a perfect spate of letters followed, many to the *Times*, wanting to know why people didn't eat more strawberry, lemon, etc.

"Take salad. Years ago we served none at all. Now our customers eat half a million dishes a day.

"Weather, of course, affects human habits. Our weather expert makes his final decision between 3 and 5 every morning. The change point in diet lies between 50 and



© Topical Press

"WHEN DOES THE NEXT TRAIN LEAVE FOR MAIDENHEAD?"

Now, thanks to this ingenious machine ticket sellers no longer need answer such frequent questions. Travelers press the labeled button, and the device flashes the answer automatically.

60 degrees. Fifty is on the cold side and people start to order more soup, hot entrees, stewed steak, hot sweets, suet dumplings, and jam rolls. Sixty is the beginning of a milder spell. Then demands upon the cold counters and ice cream increase."

So huge is this firm's tea business that it pays one sixth of the whole tea duty collected in the United Kingdom, and sells more than 1,250,000 packages of tea a day! It even owns its own plantations in Nyasaland, though these grow but a small share of all the tea it sells.

At this company's Greenford factory sits a line of tasters. These men of keen



Photograph by B. Anthony Stewart

TOWARDS MIDNIGHT COFFEE SHOPS ON "WHEELS" FILL THE COOL, DAMP AIR
WITH SAVORY SMELLS

Coffee, tea, "snacks" and cigarettes are served at modest prices to after theater crowds, taxi men, messenger boys and other late workers. Before the days of lunch clubs and exchanges London merchants, brokers and sea captains met at coffee shops to transact important business.

palates may taste a thousand different brews a day. Samples of drinking water from different places in the world are tested and tea blends are made up to suit each locality (page 13).

Robinson Crusoe never heard of vitamins but he was on the right track when he packed and stored limes and dried grapes.

This vitamin problem is only one of the many studied in Lyons' laboratory, with its 150 chemists. They not only test flour, dough and other foods for nutrition value, but make bacteriological examinations of fish, meat, and poultry, and work to control milk and its products and to keep jam and candy pure. Each year they test at least 50,000 food samples, besides supervising wrapping papers, string, and the laundering of table linen.

"You must have funny adventures serving meals to 150,000,000 people a year," I said.

"Plenty!" One excited man wrote.

"My fiancée's father has ordered our wedding cake from you. Can you help

me with a best man?" My friend has failed me through illness. If so, please state your terms."

"I told him we could send him a best man—for three guineas!"

SCOTLAND YARD IS A NAME TO CONJURE
WITH

"'Jack the Ripper' wrote this letter to the police," explained an inspector in Scotland Yard's Chamber of Horrors. "It is written in human blood."

All about this grim exhibit, not open to the public, you see burglars' tools, murderous weapons, counterfeiters' layouts, ropes that hanged notorious criminals, jewelry, furniture, and clothing that figured in famous cases. Like a frieze about the walls are ranged the death masks of men executed for crime. They stare down at you, silently, and many look quite calm and commonplace, like any normal man you might meet in the streets. "There's no art to find the mind's construction in the face."

"Here is the crime map," they said, and



© Photopress

IN LITTLE WHITE LION STREET THE LAST OF A LONG LINE OF DEVON
ARMORERS FLIES HIS TRADE

Sam Rex who inherited the craft from his father and his father's father hammers iron suits and swords out of sheet steel and sells them to theater costumers museum and people with big houses to dignify with decorative armor Nearest modern dress to armor may be deep sea diving suits

showed a big chart of London covered with red and yellow headed pins Routes taken by fugitives were marked with colored strings

Don't show him the Flannel Foot's map warned a superior The Flannel Foot is a clever thief who rides a bicycle takes only cash from houses and moves without noise his feet wrapped in flannel cloths He's a veteran—and still an exception to the rule that Scotland Yard always gets its man!

Calling all cars We know that voice on our short waves

In London it's different Scotland Yard men cruise in radio cars—some in blind cars disguised as milk wagons, newspaper or dry cleaners delivery trucks But they are all telegraphers and warnings go out to them in code No listening crook can know

It takes us less than three minutes on an average said a cruising constable to arrive at the scene of a reported crime

In a big radio room at the Yard sit

a dozen operators with headphones on And on a huge platform map of city streets are many disks which are constantly being moved about in synchrony with wireless dispatches These disks represent the cruising police cars Boat shaped symbols come and go up and down a wide streak which stands for the Thames These are river police craft

CID men they call these quiet keen eyed constables in business suits That means Criminal Investigation Department They work hard One was to dine with me Sorry he sent word Another Soho murder—I'm having a look

About Scotland Yard you see no cells no hoodlum wagons They're somewhere else Nor do you see any prisoners But their records are here—pictures finger prints and endless written reports from secret agents And over one desk this whimsical placard Softly Softly, Catchee Monkee

With our consuls in England and with visiting Department of Justice agents, Lon

don works in close harmony. That well known little book called a passport is often of curious interest to both countries.

THE ZOO'S PET CORNER

This is a unique institution, said Dr Julian Huxley, Director of the London Zoo, because it is not only a zoo but attached to it there is a scientific society. Further, we actually pay our own way and more.

Some 8,000 members of the Zoological Society pay about \$15 a year each in dues, a fee which has not been increased in the last hundred years.

Excuse me if I smell of ether, said Dr G. M. Ververs of the Zoo's staff. I have just manicated a cougar. I had to give him the anesthetic to make him lie still.

What is the most popular sight here?

Well, the public seems to think it is this Pet Corner. Here we have various tamed animals. For a shilling the visitor can come in here and play with the animal he likes best and have his picture made with it (Plates X, XI).

To some people the fact that we haul salt water here by the ton from far out on the Atlantic for the comfort of sea animals is most interesting.

Others are fascinated by our parrots that fly about in comparative freedom. Still others study this pair of gorillas, the only such pair in captivity.

Their board costs about \$40 a week and includes cod liver oil and boiled chicken. When the male was younger I used to go in the cage now no one would dare risk it.

One pair of giraffes here had 15 young in a period of 20 years. At Whipsnade in the country, the Zoo has one pair of Baringo giraffes that run out of doors all winter. They have actually been seen breaking ice on their trough to get water.

Some of the aviaries in paddocks of this Zoo are covered with green turf or sod.

This is frequently changed and not only furnishes fresh green food, said Dr Ververs, but it also keeps occupants in better health.

Queer lung fish are shipped here from the Tropics encased in blocks of dried mud. These blocks are dissolved by soaking and the fish then revive.

If a snake's cage gets too hot or too cold, a thermostat rings a warning bell which calls the keeper.

A myna bird talks freely to visitors usually about the time of day and human rascality.

Ringing sounds like an avial chorus rise from the bellbirds' cage.

A trumpeter hornbill was busy plastering shut the door of his wife's nest so she couldn't get out till her eggs hatched.

But he will leave a little hole in that mud wall, said Dr Ververs, through which to pass food to her and to the young.

That African anteater is the laziest animal here, he continued. We went in to where he lay and I shoved him hard with my foot. He didn't move or even grunt.

Along came a girl worker carrying a sick chimpanzee to the isolation ward. They all like that girl, said the Doctor. But every chimp has its favorite. I saved one female when she had pneumonia. Now her attitude toward me is really embarrassing. It takes a young chimp eight or nine years to grow up.

That sloth's hair grows upside down. To sleep, as you know, he hangs under a limb. Naturally his hair hangs down and becomes fixed that way. While he is asleep this is good because it lets the rain run off, but when he stands upright his hair goes the wrong way.

To neutralize cat smells in the feline hotel, Dr Ververs invented an ozonizer. This not only deodorizes but prevents diseases like distemper. I leaned over the apparatus and smelled the fumes which suggested clean sea side air and kelp.

THE LONDON STOCK EXCHANGE

The London Stock Exchange, called the mart of the world, has raised capital not only for endless private enterprise but for developing backward nations overseas.

As early as 1283 brokers had to take an oath before the Mayor. They brought rich men into touch with borrowers and aided the flow of new capital into business. Many were mere agents getting a fee for selling corn, wine and cattle.

Actual dealers in shares of stock appeared only toward the end of the 1600's when the public began to look for some method of using its gold savings.

Speculation in stocks grew so wild by 1697 that an act was passed to stem the tide. Such wildcat stock selling schemes involved plans for perpetual motion machines to breeding milk bearing asses. One

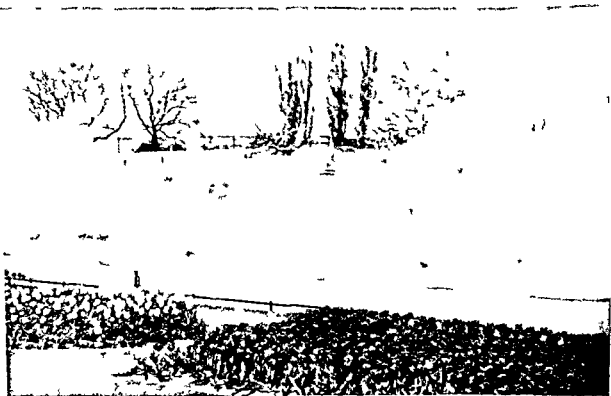


© National Geographic Society

Enslay Photograph by B. Anthony Stewart

QUEEN VICTORIA IN CORONATION ROBES AS SHE ASCENDED THE THRONE IN 1837

Sir George Hayter painted this brilliant portrait of England's longest reigning sovereign. It hangs in the new wing of London's National Portrait Gallery. The 63 years of Victoria's rule spanned the swift growth of her Empire and saw the development of the steamship, the railroad and the beginnings of ocean cable communication, textile weaving on a large scale, penny postage and the automobile.



HAUGHTY BACTRIAN CAMELS BEAR YOUTHFUL RIDERS IN THE ZOO

More than 2 000 000 visitors enter the Zoological Gardens every year. About 10 000 animal inmates consume nearly \$75 000 worth of food annually.



© National Geographic Society

Field Photographs by B. Anthony Stewart

ALL DRESSED UP FOR THE CART HORSE PARADE!

Hundreds of horses and wagons turn out for the annual Regent's Park cart horse show. Medals (two hang from the horse's collar) are awarded to the best looking combinations.



ZOO PARROTTS BOB AND CHATTER FOR FASCINATED SCHOOL CHILDREN

More than 3 000 animals usually are on exhibit. Salt water by the ton is hauled from far out in the Atlantic for the comfort of sea specimens.

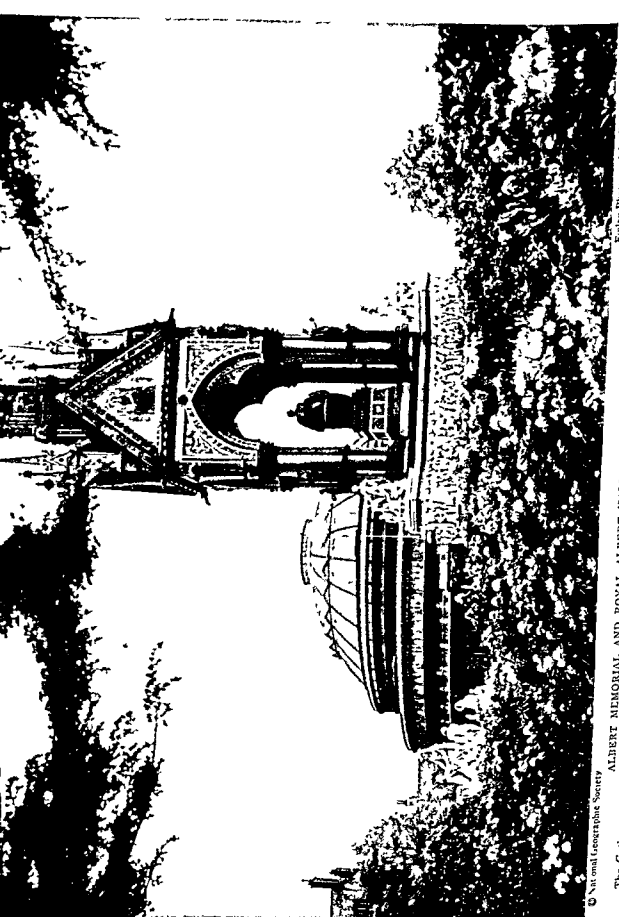


© National Geographic Society

Play Photographs by Anthony Stewart

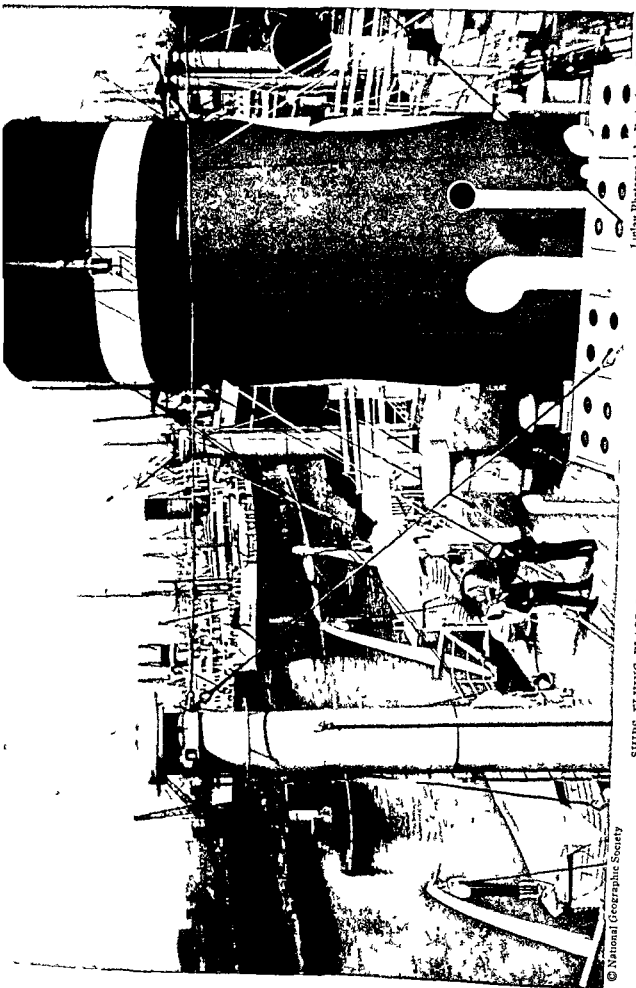
NEVER TOO OLD TO BOWL

Pensioners in the Chelsea Royal Hospital for aged soldiers keep limber with a game of bowls. Sir Christopher Wren designed the building for the institution founded by Charles II.



© National Geographic Society

ALBERT MEMORIAL AND ROYAL ALBERT HALL CONVALESCENT DUFFIN VICTORIA'S CONSORT
 The Gothic canopy of the Memorial which shields the bronze gilt figure of the Prince stands on
 artists of all periods. The well-known Royal Albert Hall in the back round sea a 8000 for
 sculptor also is used for meetings, exhibitions...
 Finlay Photograph by H. Anthony Stewart
 marble reliefs depicting
 for concerts, the great



© National Geographic Society

SHIPS FLYING FLAGS OF MANY NATIONS CROWD ROYAL ALBERT DOCK

1 inlay Photograph by H. Anthony Stewart

"Thames traffic makes London the world's greatest river port." Every day some 500 craft big and little, pass through the mouth of "London River." The Royal Albert, Royal Victoria and King George V Docks form a single structure and enclose the world's largest sheet of dock water. Often 40 or 50 ships tie up here at one time.

THE CALEDONIAN MARKET IS WORLD FAMOUS AMONG BARGAIN HUNTERS

Second hand shoes from Hollywood sell at a premium! Everything from old tennis balls to bathtubs is offered for sale here. Valuable antiques are frequently picked up for a song.



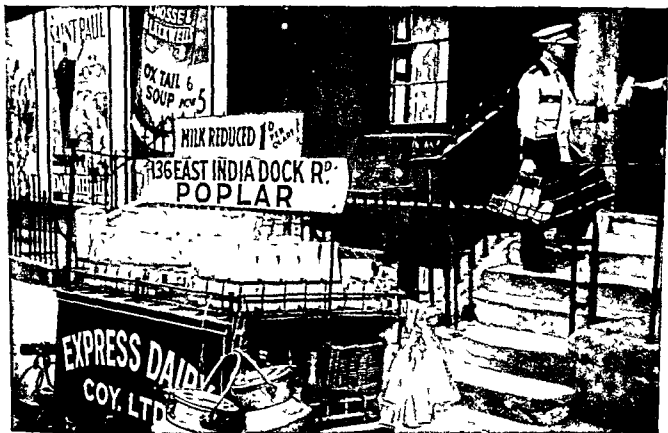
© National Geographic Society

Finlay Photographs by B. Anthony Stewart

MR. MUDGE ARRANGES HIS FLOWERS IN COVENT GARDEN MARKET

Established by royal charter in 1661, Covent Garden is London's chief market for fruits, flowers, and vegetables. Friday is the busiest day. The flower market glows brilliantly on Easter Eve.

THE POMP AND PULSE OF MODERN LONDON



THROUGH LIMEHOUSE STREETS MILKMEN PUSH THEIR CARTS

The Limehouse district, long the haunt of Chinese opium dealers and petty racketeers has now become a quiet and orderly part of London. It takes its name from vanished limekilns.



© National Geographic Society

Finlay photographs by B. Anthony Stewart

DERBY DAY AT EPSOM DRAWS OUT FAMILIES OF 'PEARLIES'

The gala-day costume of London costermongers (originally apple sellers) is encrusted with pearl buttons. A bespangled Mexican chief who visited England is reported to have inspired the style.



© National Geographic Society

Play Photograph by B. Anthony Stewart

AN EAST END SYMPHONY OF SALESMANSHIP
 Streets of fruit and vegetable stands abound in poorer parts of London. Here glaring posters compete with polychromatic piles of fruit for marketers' attention. Huge type offers vaudeville, cinemas, cigarettes (luxuries all!) to purchasers of necessary fruit.

in which shares were sold said its purpose would be announced after all the capital was raised!

Even then brokers were versed in the art of getting "tips," and advance information of events likely to affect prices. It is written that one speculator paid £6,000 a year to the Duke of Marlborough to go with his army so that he could get first-hand war news for use on the stock market.

This Exchange came into being to trade in the National Debt, to this day, the bulk of business is in "the Funds," and in the national debts of foreign countries, dominions and colonies, and the municipal debts of local authorities at home and abroad.

The founding of the Bank of England in 1694 gave impetus to this trading in Government bonds, and it was here the modern stock company, as we know it, was gradually evolved.

One writer says "Mr Pepys had stored his wealth in silver plate, in deposits with the goldsmiths, and in loans to his patron, Lord Sandwich. The discovery that the purchase of a piece of paper would pay higher interest, forestall the thief, and perhaps even bring to its happy possessor a substantial bonus by way of capital appreciation, went to the head of the rapidly increasing capitalist population of London."

Three chief classes of securities dealt in here now are the debenture or bond, the preference share, and the ordinary share.

Nobody knows how many shares are bought and sold daily on this Exchange. Unlike our practice in the United States, daily papers do not publish this total turnover because the Exchange directors will not give it out.

However, a quick glance at the financial pages of any leading London paper shows column after column of listed stocks and their daily price ranges.

Besides quotations from abroad, London prices are shown for stocks in British railways, banks, textiles, metals, steamship lines, plantations, breweries, hotels, motor and aircraft companies, Indian, Canadian, and foreign railways. In fact, here is a catalogue of practically all the great corporations in the world whose stocks are bought and sold, and a list of all securities from every government known to investors.

It was the passage of an act in 1862 under which limited liability companies could be set up which gave final impetus to the London Stock Exchange as a capital

market. Under this law, the liability of any shareholder is limited to the amount of money he has invested.

Because the London Stock Exchange closes a few hours earlier than that at New York, by a difference of time, London brokers and jobbers swarm in the street about the Exchange building for hours afterwards, in what is called the "American market." Rain or shine, the crowd is packed in the narrow confines of Throgmorton and adjacent alleyways, messenger boys squirm through the crowd, and excited voices cry the bid and ask prices for well known American stocks (page 26).

In July, 1773, the name "The Stock Exchange" was formally adopted, and in 1801 the present Exchange in Capel Court was established.

BROKERS IN PLAYFUL MOOD

"Subscribers Only Admitted," says a sign over its door. It has no public gallery, like the New York Stock Exchange, and any outsider who, by accident or design, strays in is hunting trouble. Any invader is soon spotted, and up goes a warning yell of "Fourteen hundred!" Immediately brokers and jobbers come running from all directions to eject the intruder.

"He is sure to lose hat and tie, and lucky if he can even keep his trousers," said a broker.

"Why do you yell 'Fourteen hundred'?"

"Its exact origin is lost. Some say it arose at a time when we had only 1,399 members—and that the 1,400th man was therefore an interloper."

Besides brokers, stock jobbers are also members here. They own outright the shares they deal in.

Brokers here are a playful, exuberant group, as on the New York Exchange. To wear a too loud tie, or a new suit of striking pattern is to run the risk of being placarded, or "mussed up."

Practical jokes, such as the old funnel and penny game, are still played when a victim can be found. One old broker, now nearly 90, is very fond of that ballad,

"After the Ball," popular in London in the 1890's. Moderns, of course, have seldom heard the song in public, but this old man has taught it to his colleagues and because they like him they often gather about his seat and sing "After the Ball" to him.

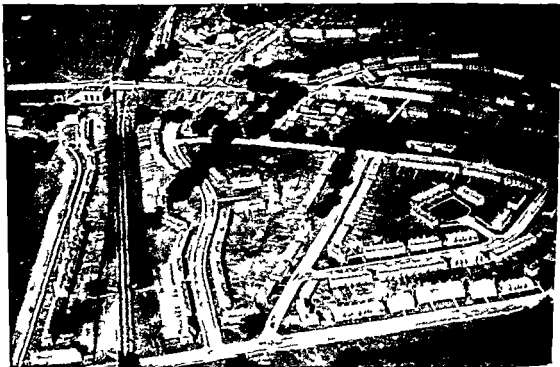
Another old member is fond of his daily nap, and over his bench is a sign which



Photograph by H. Anthony Stewart

WHITE TIE TOP HAT SILVER SLIPPERS—AND FRUIT CRATES!

Opera is sung here in Covent Garden Theater set squarely amid market stalls fragrant with fruits, flowers and vegetables. Soon after the singers' last notes fade, early morning vendors' yells arise.



Photograph by Aerofins

**ON WATLING ESTATE, HENDON, STANDS THIS EXAMPLE OF MODEL VILLAGES
BUILT FOR PEOPLE BEING MOVED FROM CROWDED LONDON**

Slum clearance and the tearing down of other dwellings to make room for new parks and factories is moving an army of people into suburbs rising now in fields and pastures around the rim of London (page 6)

reads 'The ram sleeps here every day from three to four

Amateur dramatics glee clubs and athletic contests including an annual endurance walk from London to Brighton are popular aspects of a London broker's life

London lends less money than when the gold sovereign was the world's most popular coin Yet unquestionably it is still the earth's biggest banker Here are more banks than in any other city Branch banks numbered by thousands are thick as chain stores in American cities

Though privately owned the Bank of England is tax receiver and financial agent for the Government which is its best customer It prints the Bank of England notes the only paper money that circulates in England and holds the Nation's gold reserve Paper for its notes is made secretly from rags in one carefully guarded mill (page 15)

Many banks are larger but none is more mysterious You ask in vain to see its vaults or to get it to talk about itself In the great wall that surrounds the Bank of England for safety in time of riot there are no windows at dusk soldiers tramp through London streets to guard The Bank

If I work late I can't get out myself without giving the password which is handed to us each day in a sealed envelope an official told me



© E. O. Hoppé from De en Le gh

ABSORBING THE WISDOM OF THE SPHINX

Schoolboys study their ancient history lesson under the watchful eyes of one of the two bronze figures guarding Cleopatra's Needle on the Thames Embankment Bombs fell here during an air raid in 1917

Enter the Bank through a high prison like door and immediately a tall guard in a long red coat halts you to ask your business

The Big Five banks—Barclays Lloyd's Midland Westminster and National Provincial each with many hundreds of branches form the reservoir of the London money market On their colossal deposits Empire trade and industry depend for credit

Barclays is an example of the modern fusing of many banks to form credit units large enough to meet the growing demands of larger and larger industrial combina



© Charles E. Brown

WHERE REGENT STREET CURVES, LONDONERS CALL IT 'THE QUADRANT'

The wide thoroughfare was laid out about 120 years ago to enable the Prince Regent (later King George IV) to reach a proposed country villa which was never built. Most of the original houses on the street have disappeared, today it is lined with fashionable shops and restaurants. Piccadilly Circus at the upper end of the arc is not a tent show as its name suggests, but one of the city's busiest traffic centers.

tions. It has more than 2,000 branches, and owns all, or part, of other banks operating in foreign lands.

Barclays receives and transmits to Washington the dues of the National Geographic Society's members residing in the British Isles, a convenience arranged for British members.

MAKING THE TROPICS SAFE FOR TRADE

Scurvy, in the old days, could kill half a London ship's crew. Yellow fever, cholera, and plague scattered London traders' bones from Bahia to Shanghai.

'Today malaria still kills more people than does any other disease,' said Sir Malcolm Watson. 'But we can conquer it, if the layman will help.' He is the Director of Ross Institute, a department of the

University of London's School of Hygiene and Tropical Medicine.

It was Sir Ronald Ross who experimented to show how malaria germs are passed from one man to another by mosquitoes, and it was Sir Malcolm Watson who, by his pioneer work in Malaya, demonstrated that malaria could be eradicated or controlled.

Work of this School in the control of tropical diseases is important to the whole world.

In one laboratory, warm as the Everglades of Florida, are jars in which air bubbles from the end of a pipe. When you look closely at these jars you see in the green slime snails of many shapes and sizes. They have been sent from every region in the Tropics and each has its home in its own special jar. They are used in



Photograph by B. Anthony Stewart

**TEA SHIPPED BY THIS STAID OLD FIRM BECAME Tinder FOR THE
AMERICAN REVOLUTION**

Still doing business in Creechur Lane are the successors of the original company whose tea was dumped into the harbor at the Boston Tea Party in 1773. Conspicuous on the shelves today are goods from the United States notably prunes from California.

the study of a disease so old that it has been found in Egyptian mummies.

In another laboratory are cages of mice. One hundred thousand mice have been used in studies that will it is hoped throw light on the great epidemic diseases, such as influenza which killed millions of people in 1918.

In this School chemists and bacteriologists have combined forces. The latter grow bacteria by the bucketful, so that chemists can extract their poisons and prepare them as pure drugs.

**MOSQUITOES WEIGHED, DAY AFTER DAY,
BY THE POUND**

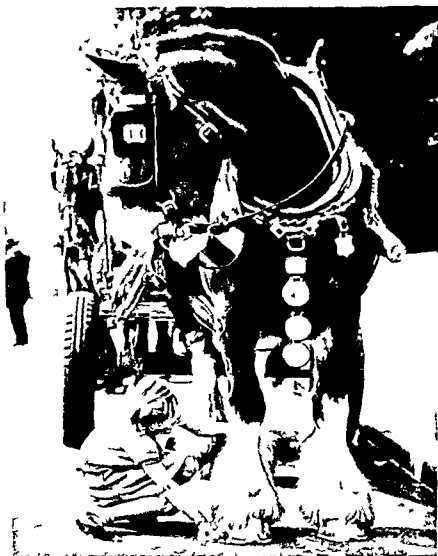
In still another laboratory are mosquitoes by the thousand, you might say by the pound! In some experiments 1,000 baby

mosquito larvae are put in a jar, fed on special food, and weighed every day, just as human babies are weighed, and for the same reason, to see whether they put on weight.

Not much is said here about what is going on but you sense a feeling of hope under all this cold scientific self-control!

While this School fights all tropic diseases," continued Sir Malcolm, "and aids industry in solving factory ventilation, lighting, noise control, etc., malaria and tropical hygiene are the chief concerns of the Ross Institute.

'Look at it this way. In the 16th century high adventure lured Englishmen—as well as Spaniards, Portuguese and Dutch—to explore new worlds and build up overseas trade. Disease killed as many of



The photograph from Plate X

SHE'LL BE THE PROUDEST GIRL IN THE CART HORSE PARADE

In preparation for this big annual event in Regents Park the little lady polishes the hair-crooned hoofs of her father's big Clydesdale entry. Why don't you shave off those feathers? a Cockney driver was asked. It takes the pride a day from the horse, he answered. Many carts nowadays have rubber tires (Plate X).

these explorers as did their human enemies.

White men could never have safely grown tea and rubber, cut teak and mined tin in Siam, or run trading posts from Singapore to Trinidad, unless medical science had helped them. Yet it was not till the 19th century that a spirit of adventure also infused the medical men of many races, then the discoverers of Koch of Germany, Pasteur of France, Lister, Manson, Bahr, and Ross of Britain, and Reed of America, opened a new era in medical thought.

Now whites live and work in the Tropics

without fear if they apply practically what science has learned about how to control tropical disease.

The trouble is they do not all ways do it. After Lister made his discovery there was a time lag of nearly a generation before antiseptic surgery came into wide use. History repeats itself by a similar lag in malaria prevention as was recently seen in Ceylon, where about 100,000 people died from this disease.

After years of malariology work on one estate alone in Malaya, the Rubber Growers' Association reports that malaria cases declined in ten years from 6,185 cases treated to six cases!

You keep talking about London because you are writing about London, but our tropical disease control

while studied here in our Laboratory on Keppel Street is for the whole world's good.

So all the world that labors in the Tropics may benefit by our work here, planters, miners, engineers, missionaries, all come here to study at our laymen's courses. This year 160 men and women came from tea and rubber estates, mines, teakwood camps, sisal farms—from all the tropical world—also many missionaries, including nuns.

London's overseas trade and colonization both benefit from the good work done here. Today in India 300 plantations, jute and

sugar mills, and southern Indian tea estates find malaria death and sick rates much reduced, owing to the work of trained men sent out by the Ross Institute

'Copper mines in Northern Rhodesia report the malaria death rate cut 75 per cent in one year Zambezi's new bridge, in a notoriously malarial region familiar to Livingstone, was built without one case of malaria among Europeans The list is long, too long for record The point is that but for medical science, London's colonies and overseas ventures could never have reached present expansion, but for doctors, we might not boast that the sun never sets on the British flag

Today," continued Sir Malcolm 'airplanes add a new peril to fever control—especially that of yellow fever

We are only realizing today how great is the danger of yellow fever reaching Asia from Africa A report by the League of Nations summarizes the researches carried out during the last ten years mainly by the Rockefeller Foundation

THE PERIL OF YELLOW FEVER

'Whereas ten years ago we thought that yellow fever was a rapidly disappearing disease and that men would soon talk of it as something historic, researches have now



Photograph by Lionel Green

SIDEWALK ARTISTS WITH COLORED CHALK CONJURE RED INDIANS FROM THE PAVEMENT

Keenly sensing what will appeal to the public they choose subjects ranging all the way from Dickens characters to Haile Selassie With his battered hat ready to catch the pennies of passers by this man at work just outside the Tower of London bids for their attention with portraits landscapes and still life studies Sidewalk masterpieces are short lived as they last only until the next shower or the street cleaner comes along

shown that it is deeply embedded in the forests of South America and central Africa, and there is very little likelihood in the immediate future or even in the distant future, of our having any real control over this deadly fever The dangerous thing to Asia is the rapid communication between Africa and India by airplane A plane service from West Africa starts in a yellow fever zone and a passenger traveling by it could reach India within the incubation period of the disease



VINTNERS IN LIVERY AND TOP HATS BEAT THE BOUNDS' ONCE A YEAR IN LONDON

The ancient custom according to one legend originated at a time when cluttered streets had to be swept to make way for the Master and Wardens of the Guild when they went to church. Wine merchants belong to an old and honorable guild. Port wine from Portugal is among the city's favorite beverages. Vaults controlled jointly by the Customs and the Port of London Authority annually receive many million gallons of imported wines, some of which have now aged 40 or 50 years.

To this fever the East is more and more exposed. Millions would surely die should yellow fever reach such close-packed cities as Bombay, Calcutta, Singapore, and Hong Kong.

Facing this grave danger, said Sir Malcolm, the Government of India has set up most careful control at Karachi where planes that might bring yellow fever enter India.

This School then is but another of London's infinite world-affecting activities.

London's own public health problems since the historic tragedy of the Great Plague, the cholera and other epidemics have been simplified by modern sanitation which has brought ample pure water and the clean, swift disposal of garbage and sewage.

Since the old days when open drains in the middle of the streets befouled the town and drove many people to build their homes outside the city, two vast sewer systems with 370 miles of pipes have been laid, one

on the north side discharges at Barking, and that on the south at Crossness. Thames tides keeping the lower river clear.

Murky coal smoke which used to mix with fog to make London so dark and grimy is now much diminished by the increasing use of gas and electricity. At Beckton rises the greatest of all gas works; it has its own wharves and collier fleet and, with smaller plants, consumes the astounding total of more than 4,000,000 tons of coal a year.

WHEN LONDON HAD WATER CARRIERS

Water for London used to be carried by rough characters who called themselves the Brotherhood of Saint Cristofer of the Waterbearers. They were a distinct class, akin to the swarthy rascals who in some Oriental towns, still peddle water from goatskins.

For generations after 1582 clumsy wheels turned by the tide under London Bridge pumped water, insufficiently for the



© Associated Press

NOT CLASSIC DANCERS BUT STUDENT WAITRESSES, LEARNING TO BALANCE TRAYS GRACEFULLY

On the roof of the Lyons Teashops Building in Orchard Street London every would be 'nippy'—London's nickname for waitress—is put through a course in physical culture to improve her poise and carriage. The immense chain of Lyons eating places serves more people in a year than live in the United States and sells enough dishes of ice cream daily to supply every citizen of Philadelphia. One 40 year old customer offered \$25,000 cash in advance for two meals a day for the rest of his life. Another ordered a wedding cake to match his bride's leaf brown bridal frock!

city. But, for centuries, how to get enough good water was a constant problem. Even as late as the 19th century, though five or six different companies then operated, one section of London might have ample water, while its neighbors went thirsty.

In this period engineers began to bore artesian wells through the clay and chalk beds that underlie London. Though hard, this water is very pure and to this day many hotels, breweries, and other large water consumers use such wells.

ONLY THE THAMES CAN SLAKE MODERN LONDON'S THIRST

But now London has grown so large that only the Thames can satisfy it. In 1904 the Metropolitan Water Board took over all private companies and now pumps water from the Thames and the Lea into vast artificial reservoirs, such as the Queen Mary

near Staines and the King George V near Enfield.

From these sources the city and districts far beyond the limits of London County now take more than 230,000,000 gallons daily.

Today, if every man in London did nothing but carry water, not enough could be brought by men on foot with buckets to meet the city's needs!

So it is, whether in tropic jungles, or here in ancient London, British civilization still works, patiently, without pause, that man may live in health, happiness, and safety.

Men's names—their buildings and their machines—may change. But behind the scenes, the mind of London, shrewd, bold, adventurous, is the same indomitable spirit that has made her, indisputably, the Old World's most influential city.



© American Colony Jeusalem

TRIBESMEN BARGAIN FOR RUGS IN THE MARKETS OF BEERSHEBA

The Bedouin is too fond of bartenag to hurry when making a purchase. It is naught it is naught saith the buyer but when he is gone his way then he boasteth (Proverbs 20 14). Rug weaving like most domestic tasks is woman's work. The famous ancient wells of Beersheba with copings cut by the bucket ropes of many decades have now been modernized (page 63).

BEDOUIN LIFE IN BIBLE LANDS

The Nomads of the "Houses of Hair" Offer Unstinted Hospitality to an American

By JOHN D. WHITING

AUTHOR OF *PETRA ANCIENT CARAVAN STRONGHOLD* *BETHLEHEM AND THE CHRISTMAS STORY* *AMONG THE BETHLEHEM SHEPHERD* ETC. IN *THE NATIONAL GEOGRAPHIC MAGAZINE*

MY EARLIEST recollections go back to the time when all the homes in Jerusalem were huddled within the imposing city wall built by Solomon the Magnificent. In those days a medieval atmosphere still clung to the Holy City. Every night at dark the iron sheathed and studded city gates were closed and barred until dawn. The governing Turks took every precaution against the threat of Bedouin attack.

Our house was perched on the highest point of the north city wall, close to the Damascus Gate. Built like a miniature stone castle, with upper and lower domed courts, it surrounded an open, stone flagged patio.

WHEN BEDOUINS COME TO CALL

I can just remember Ali Diab (Ali the Wolf), at that time the powerful Sheikh of the Belka Bedouins. Our elders used to visit his Trans-Jordan camps. He, in turn accompanied by a retinue of lesser chiefs, spearmen, and Negro slaves, used to pass days at a time at our home.

Arriving from a 40 or 60 mile trek, they would stride into the patio, the iron heels of their red top boots clattering on the stone pavement. First, they disarmed, for they said ours was a house of peace. On hat pegs in the closed court they hung a long row of silver sheathed scimitars. Moroccan holsters with twin flintlock pistols, and an occasional broad mouthed blunderbuss. Each horseman planted his long spear in one of the rose boxes in the patio.

Well can I remember mounting the steps to the upper court when no one was around, climbing into a flower box, and with difficulty leaning far over the iron railing to grasp the spearhead. Brushing aside the plume of black ostrich feathers, I felt with boyish joy the keen edge of the long, wicked blade.

Thus from an early age I was intimate with the Bedouins. Since then I have even been adopted into their tribes. Often have I partaken of unstinted desert hospi-

tility in their black tents. Weeks and months I have passed riding on horseback, or on swift racing camels, or, more recently, in comfortable American automobiles, through their deserts and oases.

A SUN BAKED, FROST CHILLED LAND

Trans-Jordan, where I have enjoyed many interesting experiences among the Bedouins, is a little country. Separated from Palestine by the great valley of the Jordan, the Dead Sea and Wadi el Araba on the west, it is hemmed in by the Levant States, Iraq, and Arabia. It is a British protectorate ruled by His Highness the Emir Abdullah Ibn Hussein, son of the late King Hussein of Hejaz and brother of the late King Faisal of Iraq (map, p. 72).

A little fringe along the Jordan and Dead Sea depression is fertile because of perennial streams. Otherwise all is waste. It is a rolling plateau desert, mostly composed of white chalk and sandy soil. Flint chips and lumps of basalt are widely scattered.

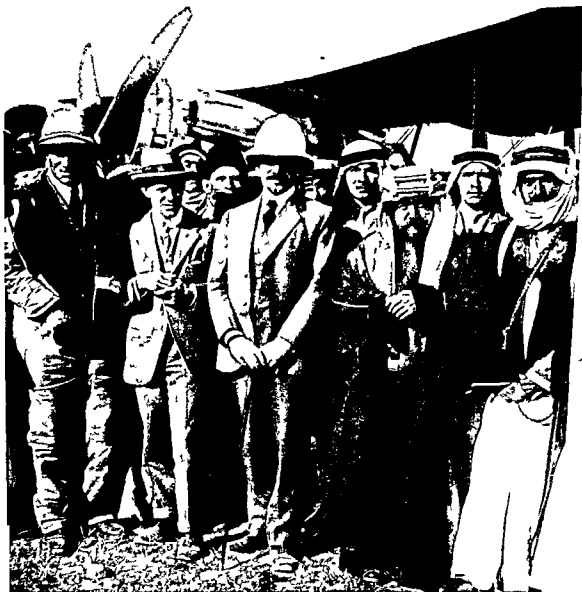
There are no rivers. The Bedouin gets his water from ancient rock cut water cisterns, from pools that collect in the wadi beds in winter, or from deep wells.

After winters of abundant rains and snows, the valleys and wadies may be lush with vegetation and aglow with wild flowers. In summer the whole desert is parched and dry. Scorching hot during the day, it is often bitterly cold at night.

Camel herders and shepherds who pass the night in the open, with only an old coat to sleep in, complain of the temperature changes. So did Jacob when he said, 'In the day the drought consumed me, and the frost by night' (Genesis 31:40).

NOMADS LOOK DOWN ON FARMERS

The Bedouin inhabitants of Trans Jordan are divided into three classes: the peasant farmers who live in villages and cultivate the soil, the seminomads who live in tents and have flocks and farm lands, and, lastly, the true Bedouin nomads, who live off their flocks and herds and migrate



© American Colony Jerusalem

THE GEORGE WASHINGTON OF ARABIA AT AMMAN IN TRANS JORDAN

The late Col T E Lawrence (second from the left) paid his last visit to his Bedouin friends in 1923 during a celebration of Great Britain's recognition of the independence of Trans Jordan under the rule of His Highness the Emir Abdullah (second from the right in front). Colonel Lawrence was known only as an archeologist and classical scholar until he embarked upon his 'one man expedition' to inspire King Hussein and his four sons in their revolt against the old Ottoman Empire (page 59). In 1927 he changed his name to T E Shaw and so signed his own translation of the *Odyssey* of Homer. In the center with the cane stands Sir Herbert Samuel, then High Commissioner for Palestine. At the extreme right is the Sheik Majid Pasha el Adwan (pages 69 and 81).

over long distances, even into the depths of Arabia proper.

All three classes look like true Bedouins and speak the same dialects, wear the same style of clothing, eat the same food, and share the same traditions. But the nomad Bedouins look down on the other classes and call them *jellahun* (farmers). It is this wandering tribe I tell about here.

Most vital in a desert country is the preservation of water sources. Wells are prized possessions. None but the owner tribe may draw water from them. Disputes over the use of wells have led to many a tribal war.

When Abraham's wells were seized by enemies, he had to protect himself with a covenant of possession. 'And Abraham re



© John D. Whiting

A CAMEL CHOSEN, BUYER AND SELLER SIT DOWN TO DISCUSS THE PRICE

In the market at Beersheba, the broker (white turban) persuades buyer (white *keffiyeh*) and seller (black headgear) to clasp hands. The prospective purchaser suggests a price, the seller says "God forbid." Another offer and the reply is, "Your face is more generous." The broker names a sum and the purchaser says, "You have burned it." Reply by the broker "Trust Allah the camel is beautiful." The vendor is emphatic "Not on the life of Mohammed, to whom be all praise—and so on until an agreement is reached, or the principals part in disgust. The proceedings attract an interested audience.

proved Abimelech because of a well of water, which Abimelech's servants had violently taken away" (Genesis 21:25).

Around the wells at watering times scenes are enacted which take one back thousands of years to the life of Bible days. Youths and men lead up their herds of camels. Sometimes hundreds of animals that have gone without water for days will be waiting in line for a drink.

With leather buckets and long ropes, two almost naked men draw water, chanting their weird, monotonous melodies and calling to the camels to drink. Herders keep the animals back, allowing only one or two at a trough at a time.

In these deserts where camels are the chief wealth, girls tend the goats. Shepherdesses often have a hard time watering their flocks. Camels are always favored



© American Colony, Jerusalem

AN ARAB HURDLER HAS TO HOLD UP HIS "SKIRT"

Hindered by the long *kibr*, the heavily swathed athlete clears a height of "two feet and two hands" with plenty to spare. All but the children wear the *keffiyeh* headress bound with the goat's hair *agal* (see page 78). Five of the figures wear the black *aba*, while the others have nothing over the belted white *kibr*. The stony, barren landscape is typical of Bedouin lands.



© John D. Whiting

THROUGH DESOLATE WADI EL ARABA WINDS THE AUTHOR'S CARAVAN

The author's camel follows that of the leader of the caravan Sheikh Jadduh el Asam paramount chief of the Tayaha tribe. The Arab's flowing garments often as light and sheer as chiffon protect him from sun and blowing sand (page 77)

And when the camel herders come in from their waterless five day grazing periods the girls and their flocks get particularly inconsiderate treatment

Moses befriended the daughters of Jethro when they were fighting for a chance to water their flocks. One of the girls was subsequently given him for a wife (Exodus 2:15-21)

At Beersheba in my boyhood days there were several old wells in a vast plain. They marked the gathering places of the clans. Deep furrows in the hard limestone copings around the wells had been cut by sliding ropes that over a period of many decades must have drawn millions of buckets of water.

These were not the same wells that Abraham dug but the life around them was probably much the same in his day. Today Beersheba is a small town. The ancient wells have been modernized and their air of antiquity has vanished.

A CAMEL HELPS DIG A WELL

Passing through the desert not long ago I observed an unusual event—the digging of a new well. I greeted the patriarch who was supervising the work with *Gowak* (the Bedouin salutation befitting such an occasion) which means *Strength may Allah give thee*.

Gweet was the prompt reply meaning *Strong have I become*.



© John D. Whiting

SALIM DRINKS DOWNSTREAM FROM HIS CAMEL!

The author had dismounted and his guide led the animal to water. Somehow the water makes the grade uphill from the camel's mouth to its stomach.

Two stout youths were digging in the well bottom, which was not yet very deep. They kept filling a basket with the dirt they excavated. A camel hitched to a rope and pulley and driven by a frail, overgrown boy, pulled the basket out of the wellhole. Each time a load of dirt reached the top, the old man seized it, swung it to the surface, and dumped it, while the camel walked back for another haul.

Work ceased while we stopped to chat. Bedouins never hurry. With pride the old man surveyed his three sons and the new wellhole. They digged the well only that man and beast might drink.

By our standards, they were poor people. Nightly their meal was little else than a cake of barley bread. But the old man's bearing and expression were those of a prince content with his lot.

I asked whether he would charge for the right of watering to repay him for his labors. His slight form unbent. Lifting his head, he pointed to his sons with a majestic sweep of his hand.

He said, 'Allah has requited me mercifully. In addition to these, I have other children and from His bounty we have yearly a sufficiency in our tents, besides flocks and camels. Should I pile up gold like yonder hill? What would it satisfy? Better we leave behind something whereby our fellows are benefited.'

I hoped he would find abundant water. Surely he deserved a reward for his generosity.

THE HAIR TENT AN ALL PURPOSE ABODE

The black goat's hair tent is the Bedouin's home, but he never speaks of it as



© American Company, Jerusalem

PALMS AND CAMELS FRAME A DESERT GREETING

Putting heads together in Arab lands does not imply gossip, but the ritual of correct salutation. This desert meeting occurred in an oasis of the Sinai Peninsula south of the region described in the article.

a tent. To him it is the *best sha'ar* (house of hair). Most flexible of all abodes, it keeps out sun, sands, and winter winds. During hot days the sides can be lifted or removed at will. Then the tent is little more than a sunshade. In winter the coarse, heavy fabric cuts off icy blasts.

With few exceptions the goats of these lands are black. From their shearings the Bedouin makes his tents. Thousands of years have brought little change in their construction.

SOLOMON SANG OF THE BEDOUINS

Solomon, the Poet King of Zion, sang: "I am black, but comely. O ye daughters of Jerusalem, as the tents of Kedar, as the curtains of Solomon." (Song of Solomon 1:5). Kedar was a Bible name for the Bedouins.

The house of hair is oblong and has a long pitched roof with drooping ends. The smallest tents have nine poles altogether, with a row running lengthwise down the center and shorter, lighter rows in front and back. Guy ropes extend outward from both sides and from the center of each end.

Detachable goat's hair curtains form the sides and ends of the tent. They are fastened to the edge of the roof with wooden pins and fixed to the ground with pegs driven through rope loops (page 68).

The tent is pitched with its back to prevailing winds and storms. A curtain at the central pole usually divides it into two parts. One end is called the *mahram* section (belonging to the harem). Here lives the family and here are stored bedding, rugs, copper cooking pots, and saddlery.



© John D. Whiting

ARAB "BLUE BLOODS" MAKE UP THE DESERT PATROL

This aristocratic corps of the Trans Jordan Arab Legion is recruited from the best Bedouin blood. Col T. E. Lawrence's devoted followers were largely men of this class (page 69). Superb tassels bedecked camels are types bred for endurance and speed.

The other end, usually left more open, is called *es shigg* and is the guest section where male visitors are received (p. 69).

Saha is the name of the dividing curtain (page 68). Elaborate geometric patterns of brown camel down and gray and black goat's hair are woven in the curtains on a background of white wool. Women weave the *sahas* from memory or imagination; patterns are unknown.

GUEST IN A 10 SECTION TENT

The average Bedouin tent is 8 or 10 yards long and half as wide. But there is extreme variation in size. Poor herds men's tents are frequently much smaller, while those of sheiks and richer tribesmen may be as much as 100 or 120 feet long.

In more elaborate tents, additional tent poles support the center. These tents are referred to by the number of central (or *wasit*) poles. A 4, 6, or 10 wasit house of hair means the same to a Bedouin as a 4, 6, or 10 room house to us.

I have been a guest in a sheik's tent that had nine *wasits*, or ten sections. Three sections at one end were curtained off with *sahas* for three wives and their families.

The chief wife had a double section to herself. But her apartment was also the storehouse for rugs, bedding, and food supplies for guests. Half the tent formed the *shigg*, or guest section.

In the shade at the open end of the *shigg* were tethered the sheik's graceful Arab mares.

Fourteen stout camels were required to move this home from place to place. The top alone being too heavy for a single camel, it was divided into two sections and provided with lacings to fasten the two pieces together. The tent ropes, particularly long and heavy, were borne by one camel, which carried nothing else. Larger tents are often equipped with a few long iron pegs to hold the main guy ropes.

If a Bedouin keeps no goats he buys his goat's hair cloth. But most families



© John D. Whiting

BEDOUIN LEGIONNAIRES GATHER IN A MILITARY POST

The coffee ceremony enlivens a night vigil in an isolated fort southeast of Petra. Few have visited this district famous for lofty mountain walls of brilliant sandstone. Long white sleeves show that the wearers scorn to labor with their hands (page 8)

can provide their own goat's hair, and the women spin the yarn, weave the cloth, and sew the tent together. Pitching and striking the tents are also women's work.

A HOUSE OF HAIR HAS MANY PATCHES

The only time a new tent is made is when a youth leaves his parents' home and sets up housekeeping by himself, usually with a wife or two to do the work.

The accumulated goat clippings of a year or two are sufficient to make a new strip with which to repair an old tent. Women rip out the most worn section of the roof and replace it with the new cloth. The old piece is kept in service as a replacement for a riddled stringy side curtain.

Thus year after year new strips take the place of old top pieces. The house of hair passes from father to son, never completely new nor yet entirely old.

The sackcloth of the Bible is the same coarse goat's hair material that goes into the Bedouin tents. Describing darkness

St. John said: "The sun became black like sackcloth of hair" (Revelation 6:12).

In Bible days sackcloth was worn to show sorrow, repentance, or humility. Westerners think of the sackcloth as jute or hemp burlap sacking. But our burlap is silky compared to the prickly coarseness of goat's hair sackcloth.

On the slopes of Moab, not far from Mount Pisgah, where Moses was buried in an unknown grave, lies the lonely tomb of a late medieval sheik. His 8-foot cenotaph mortared together from small, well-dressed stones, overlooks the Promised Land.

One day I paused to examine this unusual tomb. It was evidently the grave of a very important man for the roaming Bedouin is rather casual about disposing of his dead. Sides and ends of the tomb were covered with crude carvings of Bedouin coffee pots, coffee trays, tiny cups, grinding mortars, and roasting spoons.

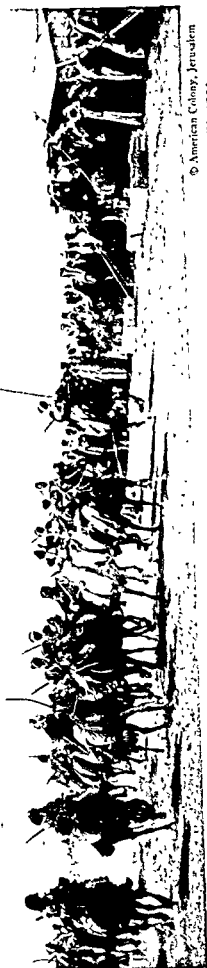
While I was studying the scene,



COAT'S HAIR "ON THE HOOP" AND IN THE CLOTH

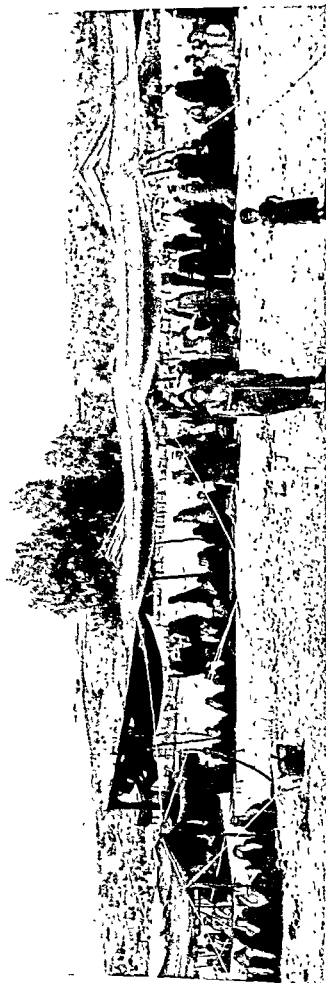
© American Colony, Jerusalem

Clippings from the flock of goats in the foreground may eventually be woven into the tent beside them (page 64). The large "house of hair" in the background, to the right of the author's white tent, was that of the Ite Shok Sound. Solomon sang, "I am black, but comely . . . as the tents of Kedar." Kedar was a little name for the Bedouin. The Fret King also likened the eyes of his beloved to the fish pools in Hebron, the oasis which supplied this camp with water. Bedouin encamp-



© American Colony, Jerusalem

"LAWRENCE OF ARABIA" REVIEWS PART OF HIS ARAB ARMY FOR THE LAST TIME, ON A VISIT TO TRANS-JORDAN IN 1923



Photograph by G. Erick Matson

VISITORS OF A POWERFUL SHEIK ASSEMBLE IN THE GUEST SECTION OF THEIR HOST'S TENT

Only men are received in the *shigg*. Detachable curtains, forming sides and ends of the tents, are removed on hot days for "air conditioning" (page 65).



© John D. Whiting

PULVERIZING DESERT COFFEE SUGGESTS AN AMERICAN DRUGGIST MIXING A PRESCRIPTION

The beans are crushed in a wooden mortar with a long wooden pestle. The tribesman pounds in rhythm 'to the accompaniment of a droll song—so many downward strokes and so many taps on the sides of the mortar' (page 72). At his elbow stand large coffeepots.

a boy told me that the tomb was that of one of the "great sheiks of times long ago," whose descendants still rule the surrounding region. I asked why the grave of so great a man should be besmeared with likenesses of kitchen implements.

CARVINGS PROVE GENEROSITY

The boy showed a haughty disdain for my ignorance. "These are not 'tools of the kitchen,'" he said, "but emblems of generosity. They mean that his coffeepot never stopped boiling, his dagger always dripped with the blood of fatlings, his meat dish was nightly surrounded by guests."

There are no inns or even fixed abodes in these Bedouin deserts. Yet hospitality toward the wayfarer is traditional. It works two ways.

The wayfarer finds water, food, lodging, and protection. The clans, in turn, are diverted from the monotony of their every day lives.

Recently I arrived at a camp of Trans Jordan Bedouins after a very hard day's journey. The sun had set and the western sky was stained with pastel pinks and purples. Welcome indeed was the sight of the Arabs' black tents nestled together in a rocky hollow.

Youths rushed from here and there to meet us. One seized my horse's head, another the stirrup to steady my saddle as I dismounted. I asked to be conducted to the guest section of the sheik's tent.

In a large camp, lesser chiefs sometimes contend with the sheik for the right of entertaining the guest. In such a case it is a desert law that the guest's choice of a host is final.

DESERT WELCOME FOLLOWS A RITUAL

As I approached the tent, the sheik came to meet me, bowing many times. Part of the exchange of greetings is a very definite etiquette of posture and movement.



© John D. Whiting

A SHIITA POURS FOR A THIRSTY CLANSMAN

Coffee is the symbol of Bedouin hospitality. It is boiled perfectly clear and its bitterness often is relieved with aromatic coriander seed. It is redistilled until so strong that only a few drops are served at a time (page 73). Crossed shoulder straps binding the chief's *kibr* are more ornate than those of the tribesman.

The sheik and I were old friends; therefore, I was treated as a person of distinction.

Each time my host bowed he dropped his hand to the ground (an expression of humility and inferiority), then touched his heart (a manifestation of affection) and his head (indicating appreciation of my wisdom). As we met I clasped his right hand not shaking it as we do. Maintaining the grasp, we embraced by placing left hands on each other's shoulders and drawing together (page 65).

The sheik placed his head over my shoulder, first on one side and then on the other. While we pressed cheeks together, we moved our lips as if kissing the air. Very intimate friends actually kiss each other's cheeks.

Jacob, in fear and trembling when he met Esau, bowed himself to the ground seven times, until he came near to his brother. And Esau ran to meet him

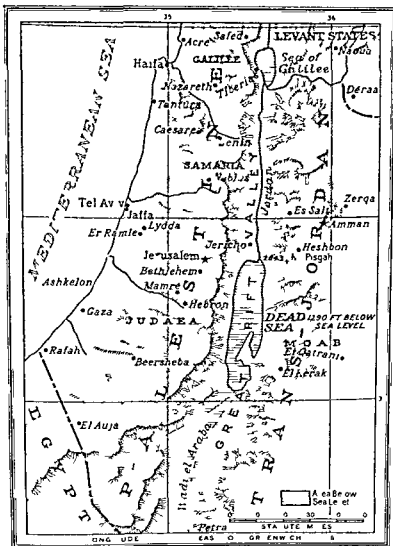
and fell on his neck, and kissed him (Genesis 33:3-4).

Had I been a stranger, my host would simply have walked out to meet me, clasped my hand, and guided me to the guest section.

CUSHIONS ARE SPREAD FOR THE GUEST

As our horses were being led away and tethered before the guest tent, other youths within spread rugs on the ground. Mattresses were laid end to end on the rugs and covered with finer rugs. Now three or four overlapping cushions for us to lean against were placed between the ends of the mattresses.

This ceremony of laying rugs and mattresses is called "spreading for the guests." Because I was an honored guest, my place was spread at the inner end of the shigg against the saha curtain. Two long rows of lesser rugs ran out as arms of a U, of which my mattress formed the base. When



THE WORLD'S DEEPEST LAND DEPRESSION SEPARATES
PALESTINE FROM TRANS JORDAN

From an administrative seat in Jerusalem holy city of three religious British officials seek accord between Arab and Jew both historic claimants while beyond the valley of the Jordan nomad Bedouin life continues virtually without change since Bible times. The shaded area including the Sea of Galilee the Jordan River and the Dead Sea is a portion of the Great Rift Valley. The surface of the Dead Sea is 1,290 feet below sea level.

the tribesmen flocked in later to take part in the entertainment they sat down cross-legged in these inferior positions.

During the confusion that attended this spreading for the guests I met many of the tribesmen. The proper Bedouin salutation follows a strict ritual of etiquette.

Salam alakum (Peace be on you) was the first greeting I received. My reply was Wa alakum es salam (And on you peace). Jesus said to the Disciples: Into whatsoever house ye enter first say Peace

be to this house (Luke 10:5).

Likewise when I left the camp the following morning, I was careful to say, With your permission and the sheik replied: Depart in peace.

My arrival in the guest tent was the signal for all the men in the camp to assemble. I was hardly seated when a fire was started in a depression in the ground at the farther end of the tent.

Near the fire stood many large and small coffeepots of burnished brass and copper with long bill-like spouts, all hand-hammered from a single sheet of metal.

The number and size of a sheik's coffeepots indicate his prestige and often the extent of his tents and tribes.

COFFEE MAKING NEVER ENDS

Among the Bedouins making the coffee is not a cook's job in the kitchen. It is a ceremony in itself. Before our last greetings had been exchanged the roasting of the coffee beans had begun.

I watched the men heat the cold coffee while they roasted a fresh lot of berries in a huge wrought-iron spoon stirring them

constantly with an iron rod (page 74).

After the beans were roasted a deep brown the men poured them into a wooden mortar and pounded them to the finest powder with a long wooden pestle. They pounded the coffee in rhythm to the accompaniment of a droll song—so many downward strokes and so many taps on the sides of the mortar (page 70).

After it was pulverized the coffee was dumped into the biggest pot mixed with water and the remnants of the last brew.



© John D. Whiting

MOURNERS FEAST FROM THE HUGE GUEST DISH

A whole ox mixed with rice and bread was served to hundreds of friends gathered to condole the Sheik Majid over the death of his aged father the late chief.

When it had boiled up in the big pot my host poured out the clear coffee into the next pot. It was boiled again, allowed to settle and then drained into the third pot and so on down to the smallest.

It was flavored with coriander seed and served to us in tiny cups of thick porcelain without handles, really like miniature bowls. This *gahwa* or bitter coffee is perfectly clear and very strong. Only a few drops were poured into our bowls.

The sheik (who always pours out the first cup for the principal guest) clicked a cup against the spot of the pot. With

his other hand drawn back, he offered it to me, pointing to his heart.

Far into the evening the coffee was poured at intervals three rounds at a time. The Arabs' coffee is very delicious and thirst quenching.

FACES ARE SUNBURNED BLACK

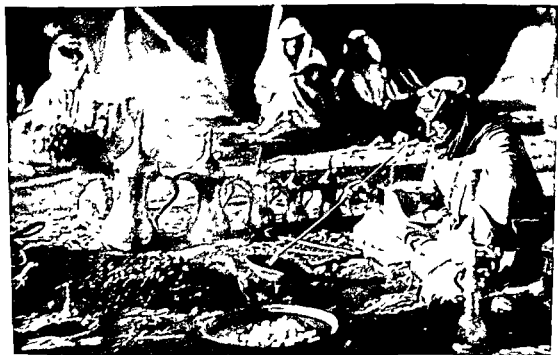
The pure type of Bedouin is of medium to small stature with a lean body, oval face, large eyes, thin lips, sparse beard and aquiline nose. Generations of exposure to the fierce desert sun have given him a complexion like dark varnish. I have known



© John D. Whiting

"GIVE US THIS DAY OUR DAILY BREAD"

A swamp Arab woman bakes on a concave sheet of iron. After kneading the dough in the big copper pan, she pats the loaf thin on a board and then throws it on the domed oven. At the left are some finished loaves. She bakes outdoors because her home is made of inflammable mats.



© American Colony, Jerusalem

BY THE NUMBER AND SIZE OF A SHEIK'S COFFEEPOTS HIS PRESTIGE IS KNOWN

Bedouin utensils are hand hammered from a single sheet of burnished brass or copper. The Arab roasts coffee beans in a large iron spoon over a camel dung fire (page 72). Coffee is served unsweetened. The tray of sugar was for American guests.



© American Colony Jerusalem

THE NATIONAL GEOGRAPHIC SOCIETY'S VICE PRESIDENT IS HONORED BY A
BEDOUIN PRINCE

Dr John Oliver La Gorce (third from the left sitting) and Col Gene Tunney (fourth from left) were guests of Sheik Majid Pasha el Adwan on a visit to Trans Jordan. The huge banquet dish, almost six feet across, contained the meat of five sheep and quantities of rice and gravy. It took ten men to carry in this huge kettle from which guests and tribesmen in strict order of precedence sat down to dine. Nowhere could there be found a finer example of hospitality and decorum than at this desert feast (page 79)

Bedouins who were almost black, though they had not a trace of Negro blood.

Bedouin women are plump and walk with an upright, queenly carriage. They grow thin as they age. I have never seen a corpulent old woman.

Tattooing is prevalent among both young men and girls. Some girls seem to be wearing lace stockings, so elaborate is the tattooing on their legs. The most popular design for the men is four small dots on the face—one each on the nose, the chin and the cheeks. They also prick designs of lions, swords, and daggers on the arms.

As a cure for a sprained wrist or ankle, rows of dots are sometimes tattooed along the injured joint.

To do fitting honor to a guest, Arab custom demands that he be served freshly killed meat. The sheik greets his visitor and at once dispatches a servant to the flocks to bring in a lamb or kid for the evening meal.

The chosen lamb is led past the shigg so

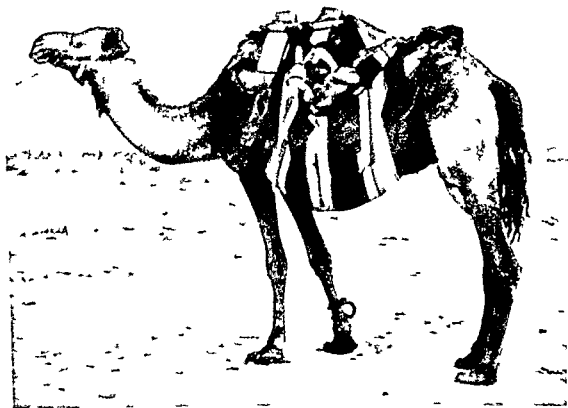
that the guest may see what an excellent fattening it is. Then it is taken away and killed in front of the women's quarters.

A chief who is entertaining a famous guest may order his whole flock led past the shigg. As the sheep trot by, the sheik runs out, draws his dagger, and slits the throats of as many as he can until the guest, seeing the honor being bestowed on him, stays the host's hand and begs that he 'sacrifice' no more.

Occasionally I have arrived at a camp when my host's flocks were not at hand. When this has happened, I have often ridden forth with the chief when he took a *dabeha* (sacrificial animal) from the first flock we came on, whether it belonged to him or not.

BIBLE LAWS STILL UPHOLD

This is a privilege protected by the strictest rules. It is an unwritten law that the animal must be replaced. And neither the ram, the ewe heavy with young, the bell



ROCK A BYE BABY, ON A CAMEL'S HUMP

© John D. Whang

Lean tough tireless the faithful dromedary carries tents cooking utensils robes curtains the owner himself or his offspring. The youngster with a talisman hung at her forehead looks out over the desert from the swaying vantage of a capacious striped saddlebag on a winter march in Wadi el Araba.

sheep nor the lamb that is habitually kept in the camp as the children's pet may be taken.

These ancient tribal laws millenniums old were the source of the parable Nathan used in chiding David. He said: "There were two men in one city: the one rich and the other poor. The poor man had nothing save one little ewe lamb which he had brought up and reared with him and with his children. And there came a traveler unto the rich man and he spared to take of his own flock, but took the poor man's lamb and dressed it." (II Samuel 12:1-4)

Servants dress the meat and the women cook it. Meanwhile the sheik's wife herself or a maid servant bakes the loaves of thin bread on a concave disk of sheet iron heated by a fire of sticks, thorn or brush.

When the meal is cooked the host himself oversees the serving.

The thin loaves of bread are shredded in large copper dishes. Over this is piled rice soaked with butter and garnished with pieces of meat.

When there are many guests there are many such dishes. Each huge dish is carried in between two or more men. The sheik leads the procession and directs the men as they set the dishes in a row down the center of the shag.

As the guests draw up to the banquet the most important are placed around the choicest dish.

It is amusing to watch the Bedouins gobble the food. They make great balls of the rice or bread soaked in gravy and pop them into their mouths one after the other. As each man is satisfied he rises



NOW IT'S YOUR MOVE!

© John D. Whitcomb

Two crones meet over a game of *mankale*. Like chess it demands much concentration calculation and forethought. Savage tribes of Africa play a similar game (see "Kbooo a Liberian Game," NATIONAL GEOGRAPHIC MAGAZINE for November, 1910). These players belong to a negroid tribe of Arabs found around the Sea of Galilee.

mutter "Praise be to Allah," and makes room for another hungry Arab.

The host himself never eats during a meal. He stays on his feet throughout, inviting first one guest and then another to partake of the feast, until all have eaten. With a large ladle, he keeps adding fresh supplies of the meat broth or melted butter. No matter how lowly a guest, he is always served before a man of the clan.

Such a tent feast reminds the visitor of the banquet at which Abraham entertained the guests of Mamre (Genesis 18 1-8).

CLIMATE DICTATES COSTUME

The costumes of the purest blooded Bedouins are rather somber, blending with their arid desert background. Every man of every class wears the *tob*, a white cotton shirt reaching to the ankles. Over this goes

a white or striped silk or cotton *kibr*. This is a sort of tight-fitting gaberdine, open down the front and bound snugly to the body by a leather belt, sometimes with crossed shoulder straps.

Most important garment is the sleeveless coat, or *aba*. It is at once the Bedouin's coat, overcoat, raincoat, and blanket. He wraps himself in it at night when he is away from camp.

The *aba* is woven of camel's hair or wool. It may be black, brown, orange, or cream colored. Sometimes it is so flimsy as to be semitransparent, and in summer hangs loosely over the shoulders. Again, it may be heavy enough to resist the roughest cold and rainy weather when it is wrapped tightly around the body. Bedouins exposed to severe winter cold may wear lambskin coats.



BEADS COINS AND CHAINS MASK A LADY OF SINAI

© American Company Jerusalem

Her hair is braided and knotted on the forehead horn fashion. A mass of silver ornaments and glass beads adorns her chest. The wearing of numerous bracelets suggests a recent fad among American girls.

A Bedouin's head is always covered with a *keffiyeh*, a square cloth folded into a triangle and bound to the head with an *agal* or double coil, usually of goat's hair. The cloth protects the tribesman's head from sun, sand, and cold.

A simple sandal, often of colored leather, is the usual footwear. Sheiks and horsemen wear a top boot of red Morocco leather with pointed upturned toe, wrought iron heel, and a long blue tassel hanging down in front. Unfortunately these are fast disappearing.

The Bedouin's loose garments trailing the men like skirts may seem cumbersome

to us, but to the tribesman they are the ideal of comfort and elegance. White cotton reflects the heat of the sun. Dark wool holds in the body warmth during the bitter winter nights. The man's apparel can be bound loosely to permit maximum ventilation or tightly to prevent it (opposite page).

Unmistakable is the artistic merit of the Arab costume. From the emirs in their spotless white, striped silks and fine camels hair garments, to the bedraggled and disheveled clansmen, all have a proud bearing and a bold stride that bespeak the freedom of the limitless desert.

MANUAL LABOR IS TABU

Innate in the Bedouin is the feeling that work

with the hands is degrading. From the highest to the lowest, each class has its unwritten code of labors that are below their dignity. Those who do no manual labor show it by wearing a *tob* or shirt with a *redan*, which has kimono-shaped sleeves so wide that they drag on the ground (p. 67).

The woman's complete costume is even more somber than the man's, but just as striking and dignified. The *tob* or dress is dyed the deepest indigo. Its monotony may be relieved by bands of lighter blue about the lower edge and the seams may be worked over in colored silks.

Differences in headgear distinguish the

married woman from the virgin. The maiden ties up her head in a large square *hatta* of the cheapest cotton or of the finest hand woven silk designed with silver threads. Usually dark maroon or black, it resembles the men's *keffiyeh*.

The married woman simply folds the square cloth into a band and binds it around her head and forehead. The young bride's heavy red silk fillet is often worth the price of a camel.

Jezebel 'tired her head like this before looking out of her tower window to see if Jehu was coming' (II Kings 9:30).

An ample supply of silver bracelets, finger rings, neckbands and jingling silver ornaments braided into the ends of the hair plaits completes

the woman's at home costume. In cold or rainy weather or when traveling she throws an *aba* over her shoulders or drapes it from her head.

Each sex is particularly careful not to ape the other. I recall searching for a Bedouin guide on the desolate eastern shores of the Dead Sea. The bark of a dog led me into a marsh where I found a youth hiding. He was ashamed because he had donned a woman's *tob* to do some rough work.

Reluctantly he consented to accompany us. All day long he led us over their paths



© American Colony, Jerusalem

THE GREATEST FIGHTING MAN IN NORTH ARABIA

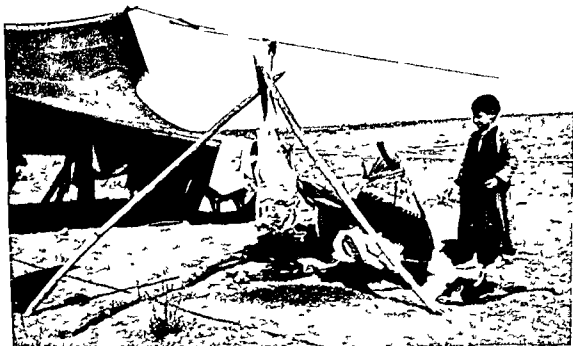
Such was Lawrence's characterization of the late Sheik Auda Abu Tayi, paramount chief of the eastern Huweitat tribe who brought more recruits and victories to the English leader than any other warrior prince. His fine costume is complete—*tob*, *kibr*, *aba*, *keffiyeh* and *agal* (page 77).

so steep that I was utterly exhausted. And when we finally came within sight of a Bedouin camp, he walked on to his still distant tent rather than be seen by fellow Bedouins in a woman's dress.

Since we met him, he had not drunk a drop of water to slake his parched throat nor eaten a bite of bread.

FIVE SLIPPS MAKE A MEAL

Once I traveled beyond the Jordan and to ancient Petra with Col. Gene Tunney, Dr. La Gorce, and their wives. We were fortunate enough to meet Sheik Majid



© John D. Whiting

A FATTED KID FOR SUPPER—AND THE BOY SMILES

And Abraham ran unto the herd and fetcht a calf tender and good and gave it unto a young man, and he hasted to dress it (Genesis 18:7)



© John D. Whiting

NOT KNITTING BUT WEAVING HOUSES KEEPS THE ARAB WOMAN'S HANDS BUSY

She strings the loom with rope twisted from swamp papyrus fiber. Into this warp she weaves the split stalks of papyrus that grow from 10 to 16 feet tall



TWO DRESSES MAKE A BIG WASHI

© John D. Whiting

The almost sleeveless *tob* hung to dry at the left belongs to a young girl while the other is that of a woman. So long are these dresses that a girdle is worn about the waist and the garment is pulled up and doubled over producing a three fold skirt that just touches the ground.

Pasha el Adwan, one of the most hospitable of Arab chieftains. Understanding that Colonel Tunney was a 'great American sheik,' he invited us to a meal and some entertainment in his camp (pages 60 and 75).

We enjoyed the coffee ceremony, the curvetting, the horse racing, the dancing, the singing, and the reed pipe music. A bard accompanied his recitations with weird strains from his *rababe*, a primitive one stringed instrument.

But it was the banquet itself that astonished us. The main course consisted of five sheep served with quantities of rice and gravy in a single dish almost six feet in diameter. It took ten men to carry in this *pièce de résistance*!

Our host stood throughout the whole meal, serving all who partook. As honored guests we received first attention. Then other guests, down the whole line of prestige, had their turn. A wandering dervish beggar was the last visitor fed.

Next followed the princes and men of the sheik's tribe, down to the Negro slaves and their children. I counted 300 who ate from the giant dish. Yet when it was carried out it was still far from empty.

After the meal, more coffee was served. While the guests remained, the sheik ate nothing. Bedouin chiefs take pride in serving well their guests and inferiors.

Hospitality among the poorer Bedouins is just as genuine, if less lavish.

ON THE MOUNTAINS OF MOAB

We once climbed the mountains of Moab, between sunrise and sunset, from 1300 feet below to about 2500 feet above sea level. The heat was terrible and the way lay over wild goat paths. Early in the day we had drunk all our water and so were parched and all done in when we finally espied a small scattered Bedouin camp.

Reaching a tent, we found only the wife at home. We had hardly greeted her before she began to spread rugs and bolsters for



© American Colony Jerusalem

A NEGRO BARD CHANTS AGE-OLD WAR SONGS

He accompanies himself on a primitive one-stringed fiddle. The performer has only four full notes at his disposal but he may divide these into quarter tones. Time and rhythm make up somewhat for the limited scale and doleful tones. Negro slaves are common in Bedouin lands.

u. She saw that we were exhausted and invited us to recline and rest.

We asked for water but she was wiser and filled a bowl with milk that had been clabbered. This is a somewhat acid drink and especially thirst-quenching for that reason. Nothing could have been more welcome.

YOUR HOST IS YOUR SERVANT

We had been resting a short time when the husband arrived. After greeting us he asked if we had been properly served and if there was anything else we wanted. When we insisted that we had to press on he directed us to the tent of the chief near by.

The chief also spread rugs and beds for us. It was springtime; the flocks were giving abundant milk and the women were very busy with butter making. Yet we were served with coffee and clabbered milk in the prescribed Bedouin manner.

Knowing that we needed rest more than

food our host ordered a light repast. He called to his women to bake fresh bread. Thus he served with a round pile of fresh butter in an engraved copper dish. After we had dipped our bread and eaten it we were ready for sleep.

An aba was laid over each of us for a coverlet and our host bade us have perfect peace until morning. Next day we ran out in time to see a brilliant desert sunrise.

How similar was our experience to that of Sisera the Canaanite captain! Fleeing in rout he sought hospitality in the tent of Heber the Kenite who was a Bedouin (Judges 4). He asked water and she gave him milk; she brought forth butter in a lordly dish (Judges 5:25). And when he had turned in unto her into the tent she covered him with a mantle (Judges 4:18).

Certainly I know of no Bedouin custom that would have justified Jael in driving a tent peg through the temples of her sleeping guest.



O Amer can Colony Jerusalem

HERE COMES THE BRIDE, A BEDOUIN, AND HER ATTENDANTS

Second from the left the bride is easily distinguished by her silk and silver headband worth the price of a camel. Over her voluminous dress she wears a jacket and a sleeveless coat. The attendant maidens wear large square headcloths of cotton or silk. (page 79)

There was a vow of peace between them which should have been complete protection (Judges 4:17). Among the desert peoples verbal oaths are as binding and in violate as written pledges.

The simplicity of the Bedouin's life reflects the silent dignity of his deserts. Frugality of resources in the deserts and oases finds a counterpart in his way of living. It is a constant struggle to provide essentials like food, water, and protection from winds and sun.

Myriads of glittering wild flowers bloom in the spring, autumn sandstorms, and

winter snows enliven the monotony of the barren background. The Bedouin, learning from Nature, brightens his life with the ceremonious entertainment of guests, colorful woven curtains, garments, and rugs, with camel racing, dog coursing, and an occasional war.

If the Bedouin survives the pressure of modern civilization, he may still return to pitch his tents among the ruins of our cities. He has weathered many previous threats to his culture.

Who knows but that his may still be the race immortal?

INDEX FOR JULY DECEMBER 1936 VOLUME READY

Index for Volume LXV (July, December, 1936) of the NATIONAL GEOGRAPHIC MAGAZINE will be mailed upon request to members who bind their copies as works of reference.



'FETCH!'

At the word of command the retriever is off with a leap from bank to water. This is Chesacraft Peter owned by Anthony A. Bliss in action in the annual trials of the American Chesapeake Club on Long Island. A real sea dog the Chesapeake is a descendant of a pair of canine sailors shipwrecked off Maryland in 1807 (Plate IV and pages 91 and 102).



The photographs by Edwin Levick

A CHESAPEAKE BAY RETRIEVER DELIVERS THE GOODS

Through the icy water comes C. Arthur Smith's Flood Tide Pete carrying a duck brought down in the Long Island water trials. These hardy dogs are well armored against the cold and often come out festooned with icicles (page 90). Those strangely tame "ducks" in the background are wooden decoys.

FIELD DOGS IN ACTION

By GREGMAN LLOYD

HOW helpless the human hunter would be without the aid of his dog! True, man can learn the habits of game, but can he catch the faint scent borne through the air from the bodies of birds 20 yards away, and know that a covey of quail lies hidden in a corner of the old rail fence? For that kind of magic he must depend upon his four footed hunting companion.

Certain breeds, including the setters and pointers, the spaniels and the retrievers, have been hunting allies of men through the centuries.*

Early forbears of modern bird dogs spread to England and other countries from Spain and the word "spaniel" is derived from this ancestry. Old English prints of two and more centuries ago picture hunting dogs almost identical with our modern setters, pointers, and spaniels.

Pointers and setters were used to 'point' the presence of quail and partridges so that nets might be dropped over the birds. Springer spaniels were trained to flush or 'spring' game birds for the hawks in the royal sport of falconry†.

EACH DOG TYPE A SPECIALIST

Each type of dog has its own particular method of working its specialty carefully developed through generations of dogs by generations of trainers and breeders.

Pointers and setters often known as bird dogs work mostly with the nose in the air. They rely on the body scent that drifts to them on the vagrant breeze from a game bird 20 or more yards away.

Watch a fine pointer or setter in action and you will see animal intelligence and training at their acme. Yonder he comes across that weedy pasture a big handsome fellow intent on the business in hand. Systematically he quarters the ground ranging back and forth but bearing stead-

ily upwind. With delicate nostrils he sifts the telltale air.

Suddenly he snaps into a perfect point with his nose pointing true, tail rigid, one fore paw uprised in mid step (Plates I and II).

But he does not hold the point. It is only a meadowlark—not fair game. He walks ahead the lark flies out, and the search continues.

Along the far side of the field he goes—busy, active, eager, questing. Then all of a sudden he becomes a statue a dog of stone. Hot and strong from the weeds along the fence has been wafted the scent of quail (pages 87 and 94).

Steadily he holds his point while his master hurries up. The fast going dog has outdistanced him. The man steps ahead flushes the covey and fires. The dog relaxes, but does not flinch or run forward. He is steady to wing and shot.

TEAMWORK IN PAIRS

Instead of a single dog sportsmen often use a brace of setters or pointers. Then if one dog locates a covey the second dog must immediately back the point by coming to a stop and looking or pointing in the same direction. To rush in and usurp his rival's game would be a cardinal sin in bird dogdom. Instead he shows a wholesome respect for the accomplishment of the other fellow. Good manners and fair play are unforgettable parts of his training and heritage.

It always seems rather remarkable to me how quickly a good field dog learns which creatures are fair game and which ones are protected by the laws and customs of man. To find a seasoned setter pointing a songbird would be unthinkable. Out of all the scents that assail his nostrils he singles those of the game his master seeks.

Once in Africa I found a dog of mine pointing strange game. A fast little female setter she had galloped far ahead and had not come back so I had set out in search of her. At last I found her frozen in a point at a ringhals a deadly spitting cobra coiled for action in the grass a few feet away. The dog was apparently hypnotized.

I fired and the shot killing the snake broke the spell. I shall never forget how

* This is the second in a series of articles on the dogs of the world with illustrations from paintings by Edward Herbert Mier. The first in THE NATIONAL GEOGRAPHIC MAGAZINE for February 1936 depicted the terriers. The third to appear in an early number will deal with the hounds.

† See Falconry, the Sport of Kings by Louis Agassz Fuentes NATIONAL GEOGRAPHIC MAGAZINE December 1920 and Eagles Hawks and Vultures with 48 portraits in color from paintings by Maj Allan Brooks July 1933.

the dog danced around me and barked, full of gratitude for her release

The question of how long a dog will hold a point is one which cannot be answered categorically. It depends on the dog. I myself have seen a setter hold its motionless pose for 15 minutes or more. One account tells of a pair of English Pointers which held a point for an hour and a quarter. Sometimes at field trials competing dogs are lost and are found afterward a long distance away, pointing game.

The bird, too, often remains still, relying upon its protective coloration. A classic story in this connection is the yarn of the man who missed his pointer and found it on the moors months later, a skeleton dog pointing a skeleton bird!

FIELD TRIALS HAVE WIDE APPEAL

The field trials for pointers and setters—supreme tests of bird dog ability—appeal not only to the hunter and sportsman but to the lover of animals and student of Nature. Not a bird is shot. The only shooting is done with a pistol loaded with blank cartridges. This is fired after a bird has been flushed, to demonstrate that the dog is not gun shy.

Excitement and tension run high as these splendid animals compete against a background of brilliant autumn foliage. Any one of a dozen mistakes may disqualify a contestant, including the premature flushing of the quarry by a highly strung dog, a sudden dash forward after the bird rather than a steady point.

The excitement communicates itself to the dogs and sometimes they break under the strain. I remember one such episode during field trials at the Duke of Portland's estate in England.

A fine Pointer, Champion Saddleback (so called because of the saddle-shaped, liver-colored marking on his back) had been kept in an old-fashioned hansom cab all day awaiting his turn. For hours he had heard the men and the guns, and the air must have been full of scent.

When at last Saddleback was 'put down,' a hare got up in front of him. Now in no case may a Pointer chase a hare, and the sight of one so far forgetting himself is enough to raise every eyebrow in the county. But as soon as Saddleback saw that hare, off he went as hard as he could run, disturbing game all over the place and finishing the trials for that day. The as-

sembled sportsmen commiserated the owner as solemnly as if he had just had a death in the family.

From September 19 to December 14, 1936—roughly three months—129 field trial meetings for pointers and setters alone were held in the United States and Canada, most of them in this country.

Usually, at the big trials in the eastern United States, the quarry is quail, but there are other events at which the dogs are run on pheasants and ruffed grouse. In the West the game may include prairie chickens and the European, or Hungarian, partridge.*

The gallery at a field trial is a gathering of sportsmen who delight in the fresh, crisp air of autumn, with its glories of crimson, russet, and gold against the dark green of the conifers. All or nearly all are not only dog lovers but dog owners. Nowadays the assembled company usually includes a number of women and girls.

In the woods and fields the young game birds have attained their full plumage. Throughout the summer they have feasted well, grown strong in body and power of wing. They are huntable game, wary, cunning, able to look after themselves.

With some formality the name of the stake is stated and the names of the dogs entered are drawn from a hat or box. Suppose the first ticket reads "Mr. Jones's Ponto" and the second reads "Mr. Brown's Peter." Then they will be the first competitors "put down" for that stake. If, on the other hand, the two dogs drawn are owned by the same person, one is "guarded" and another dog of different ownership is substituted.

In Europe the judges and handlers walk after the dogs, in the United States, where the areas to be covered are comparatively large and game is often scarce, they are mounted.

OFF LIKE A FLASH!

When all is ready, the judges give the order for the first brace of dogs to be cast off, and each handler releases his charge. Off they go like a flash, the first ranging the field ahead on the left, the other on the right. Each dog keeps to his territory.

Eventually, if game be there, it is found and pointed. If the birds are not "wild,"

*See "Game Birds of Prairie Forest and Tundra" by Alexander Wetmore, *NATIONAL GEOGRAPHIC MAGAZINE*, October, 1936.



"WHOA, GIRLIF WHOA!"

Photograph by Edwin Levick

With the scent of game birds hot in her nostrils this fine English Setter has snapped into a point. Now her handler with gentle words holds her steady while with upraised hand he calls the attention of the judges and spectators to the correct actions of the dog (Plate I and pages 85 and 91)

they remain as a bevy or covey on the ground. The other dog when he sees his rival on point, is expected to stop immediately and back the point. The game is flushed by the handler who fires a small pistol, while both dogs remain steady to wing and shot.

After the first round of competition, the judges call for the dogs they have selected to run in the second round and so on until the two best dogs compete in the final.

A COSTLY CANINE MISTAKE

A single mistake at the last minute may disqualify a dog that had seemed a certain winner. Take, for instance the celebrated black Pointer, Tap, owned by the late William Arkwright, of England, author of that mammoth work, "The Pointer."

Beginning as a puppy in 1892, Tap ran with notable success every year until 1896, when he very nearly won the principal stake at the International Field Trials at Bala, northern Wales. One mistake at the end spoiled his record.

Tap had drawn up on point when a young grouse fluttered above the heather right under his nose. The temptation was too much for the old dog which went in and gave the bird a nip. It cost him the championship.

The beauty of a dog is not considered in field trials. Performance is all that counts. Sometimes the midget, the smallest of all the competitors, wins the stake. A good example was the female Irish Setter Coleraine Diamond, bred and owned by the late Rev Robert O'Callaghan, "son of the last Irish gentleman who fought a duel on Irish soil."

The little red creature was not only faster but steadier in her points than the other setters of various breeds. I saw her run at the English Kennel Club field trials in the early nineties of the last century. A month afterward the gallant little lady was on the sea and bound for the United States, a country always on the lookout for the best of the sporting-dog breeds.

For quail, ruffed grouse, and the European partridge, nothing can beat a good setter or pointer. They can gallop faster and cover more ground than any other gun dog.

For pheasants a comparative newcomer to the United States has sprung into wide use. This is the English Springer Spaniel, an old breed long known in Europe as a pheasant hunter, but not introduced to this country in numbers until about a dozen years ago (Plate VI and page 103).

A smaller dog than the setter, to which it is related, the spaniel can easily penetrate the dense thickets and patches of brambles where pheasants or rabbits find refuge.

HOW A SPANIEL WORKS

The spaniel's job is entirely different from that of the pointer and setter. He is not supposed to point, but to spring, or flush, the game. He works with his nose to the ground, hunting for foot scent. Into every clump of bushes, every briar patch, he pokes his inquiring nose. He squeezes through tangled undergrowth. He keeps eternally busy, until at last, with a dash, he flushes a pheasant and the startled bird flies out with a whirl of wings.

Without warning the hunter must raise his gun and fire. In shooting over spaniels the tension never relaxes.

As these dogs work only about 20 to 40 yards ahead they are always in sight. The owner can see everything that is going on. The small birds that fly out of the undergrowth and perch overhead, the blacksnake that slithers away through the grass.

Nature lovers incidentally, will find an intelligent bird dog or spaniel a valuable ally. A painting of John James Audubon shows the noted American naturalist artist with his dog, a setter with a somewhat spaniel-like head.

At spaniel field trials—unlike those for pointers and setters—the game is shot and retrieved. As a dog flushes a pheasant and the shot rings out he is supposed to "drop" or sit on his haunches, awaiting orders. If

the bird falls he may be ordered to retrieve it to his handler, the faster and more gently mouthed the better.

The annual trials held on Fishers Island, in Long Island Sound, are the best known in America for this type of dog. There usually is an abundance of pheasants and rabbits and the cover is ideal for the work of spaniels. Everybody walks at spaniel trials and even the gallery is close enough to see the dogs in action.

"THE INJUSTICE OF IT ALL"

Sometimes the judges prescribe a stern test. The dog on the left has just flushed a pheasant and the gun has brought it down in a patch of bushes a short distance away. Now he sits on his haunches, awaiting the word to go out and bring in the fruits of his labor. But the judge ignores him. Instead he turns to the rival dog and gives him the coveted assignment.

You can imagine what is running through that first dog's head. He is strongly tempted to throw his training to the winds and rush off to get the bird. After all, it belongs to him, doesn't it? Didn't he sniff it out and flush that bird? What right has that other fellow to touch his pheasant?

But the true champion will resist that powerful temptation, holding his ground and swallowing his hurt pride with a self-discipline and a strength of character that few men could muster.

Although wild game generally is becoming scarcer in this country, pheasants are growing more and more plentiful because of the tens of thousands of them hatched every year under domestic hens and subsequently liberated. As they increase, I believe that more and more Springer Spaniels will come into use throughout the United States.

COCKER SPANIEL LEADS REGISTRATIONS

As this is written, the most popular of all breeds of dogs—as determined by the number of registrations received at the American Kennel Club—is the Cocker Spaniel (Plate III and page 99).

Though many are kept simply as pets, the Cocker is also trained to hunt and take part in field trials. It is best adapted for hunting woodcock, from which it takes its name.

In this country the pointer and setter like the spaniel are often taught to retrieve, but in field trials it is not expected of them.

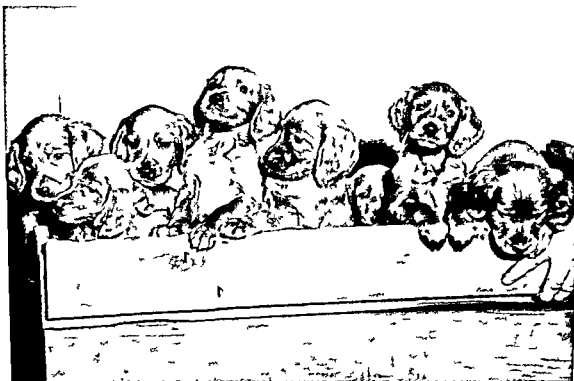


© National Geographic Society

Painting by Edward Herbert Miner

BEAUTY AND BRAINS MARK THE IRISH AND ENGLISH SETTERS

Originally, setters were trained to crouch or set on discovering game, while hunters drew nets over the quarry. Now they "freeze" in an upright position and point, like the IRISH RED SETTER (center) and the ENGLISH SETTER with uplifted paw, waiting for their masters to shoot. The dashing Irishman is among the most loyal and affectionate of pets. The mahogany red coat is a result of years of selective breeding. Formerly it was red and white. An aristocrat of dogdom, the ENGLISH SETTER is known to have been used as a bird dog for at least 400 years.



Photograph from the Kansas City Star

NINE LITTLE IRISHMEN BUT ONLY EIGHT ARE IN SIGHT

Patsy's Valentines—these puppies were dubbed as they were born on St. Valentine's Day 1936 to Patsy an Irish Setter owned by a Kansas City resident. This breed is so everlastingly active that the photographer though he tried for hours was never able to get the whole litter in view at the same time above the top of their packing box bed.

and is supposed to make them less steady on the point.

Specialists in this work of delivering the goods on both land and water are the retrievers (Plates IV, V, VII). Their place is not ahead but at the heel of their master.

All have large, sensible and sagacious heads and possess what might be called a kindly expression. The brain box and the seat of the powers of scent are well developed. They have wonderful noses. A Labrador Retriever for instance will run on the line of a winged pheasant over all kinds of land, even over rocks or pavement.

The marking faculty also is highly developed. This is the ability to note the exact spot where a bird has fallen. A good retriever may be kept down for some time after a bird has been shot, but he will carry that location in his doggy brain and go there without hesitation when the command 'Fetch' is given. If two birds have fallen, he will remember both getting first one then the other.

For duck shooting, a retriever or a water

spaniel is almost indispensable. It is wonderful the amount of cold they can stand. I have seen retrievers coming out of the water in near zero weather, their coats festooned with icicles.

My companions and I were all muffled up with fur caps on our heads, flaps over our ears and our hands in thick fur gloves. Yet those dogs would go in again and again, breaking the thin ice along the edge and swimming out through the black, icy water. After bringing in a bird, they would shake themselves and be ready for another adventure.

A heavy supply of oil in the skin protects these dogs from the cold. You can readily smell it when your retriever is drying, before the fire.

RETRIEVERS HAVE WEBBED FEET

Strangely enough, some of these retrievers—water dogs for untold generations—have developed a suggestion of webbed feet. Between the toes is a bit of membrane, a partial webbing, which undoubtedly helps them in their life work.

The sight of a good retriever in action is a splendid example of teamwork between man and animal. A charge of shot has dropped a big drake out of a leaden sky and it floats on the dark water, almost out of sight.

Fetch says the duck shooter to the dull colored dog which has been lying for hours beside the blind and the retriever leaps to obey (page 84)

Since his head is almost level with the water he cannot see the distant duck so he takes directions from his master on the bank who signals with waves of his hand—left right ahead back. They thoroughly understand one another. Sometimes to guide the dog the man throws a stone as near as possible to the fallen bird.

As he nears the spot the retriever's eyes and nose are busy and in the dark he picks up the scent which actually floats on the water. If the duck has been wounded and is swimming away, off he goes on that watery trail until at last he overtakes it among the reeds. But the capture is not a scene of tragedy. Almost as gently as a mother carries her babe he bears the bird back to his waiting master. A hard mouth is one of the deadly sins.

English Setter

The English Setter is looked upon as one of the world's most beautiful purebred dogs but its beauty is much more than skin deep. From the finely chiseled head to the tip of the feathered tail every line reflects grace and intelligence. Its gentle dignity bears witness to a lovable disposition and aristocratic lineage (Plate I and pages 87 and 107)

For hundreds of years such dogs have been valuable hunting companions of men. Long before the time of the shotgun the ancestors of our modern English Setters were locating game birds for hunters equipped with nets. The dogs were taught to approach quietly and then to set—sit or crouch—while the net was dropped over the birds. Later they were trained to point in an upright pose as they do today.

A born hunter the English Setter is used by sportsmen all over the world as a dependable shooting dog under all conditions of terrain and climate though in very hot climates a shorter coated dog might be preferred. In bird dog field trials the English Setters are always among the most numerous and popular of entrants.

Two men were chiefly instrumental in bringing the English Setter to the height of its beauty and shooting dog worth. One was Edward Laverack an Englishman who died in 1877. The other was his friend, R. L. Purcell Llewellyn of Tregwynt Penbroskeshire southwestern Wales who made outcrosses of other English Setter strains with those of Laverack.

Broadly speaking the pure Laverack type is preferred for the exhibition judging ring while the lighter built and racier Llewellyn is looked upon as having more speed in the field where fast goers are favored.

For show purposes the male English Setter should be about 23 to 25 inches in height at the shoulder and weigh from 55 to 70 pounds females less.

The body ground color is white with markings of black lemon liver or tricolor (black white and tan) distributed in flecks. For show purposes heavy markings are not considered desirable.

Irish Red Setter

This handsome dashing Irishman is wholly red a rich shade that may be likened to that of the ripe chestnut fresh from the bur (Plate I and opposite page)

At shows in the United States and the British Isles many of the leading Irish Setters are exhibited by women who apparently are attracted by the richness and the shining glory of this dog's coat.

The Irish Setter is usually a higher dog at the shoulder than the English Setter or its Scottish relative the Gordon Setter (Plates I and II). Slim and fast the Irish is longer in leg and has the sloping shoulders of the thoroughbred race horse.

As Irish Setters are high strung and often temperamental they develop more slowly and require more patient training than do some of the other breeds. Nevertheless they are natural born field dogs and are found wherever the shotgun is carried. Of old they were known as red spaniels or in Gaelic as *madradh ruadh* (red dog).

One of the leading dogs of the present day is an Irish Setter. Time and again he has won in the best in show division at the foremost events in America. When paraded at Madison Square Garden New York no dog is received with more acclaim by the vast audiences than Champion Milton O Boy.

Alphabetical by name and year of birth

SEE HOW THE WILL TALK IT JOINTLY LIES THE WAY (Jin Gay Inn) WITH A GERMAN SMOOT HAIRD JOINTLY AND CORDON SETTER
A favorite among gun dogs is England's POINTIR (with paw drawn up) Foxhound greyhound and possibly bloodhound and spaniel blood are
available in its lineage Germans bred their SMOOT HAIRD POINTIR (left) as hunter and retriever on land or in water A Scot is the GORDON SETTER
(right) after a like (four lion Many American spec mens came from Scandinavia where these one man dogs have long been poplar



© National Geographic Society

SPANIELS WERE TRAINED FOR HUNTING IN FRANCE AND ENGLAND MORE THAN 550 YEARS AGO. Though named after Spain, their origin is uncertain. "They love well their master," wrote Count Gaston de Foix, more than a century before America's discovery. The solemn puppy (right), the dog lying down, and the one standing (right) are COCKER SPANIELS, so called because of their use in woodcock shooting. The SUSSEX SPANIEL (left) has a keen nose. The FIELD SPANIEL (upper left) is an intelligent, hard-working sportsman.

Painting by Edward Herbert Miner



Photograph by H. Armstrong Roberts

'ON POINT AT THE SUDDEN SCENT OF QUAIL

Running the rough cover near Mount Holly, New Jersey, the Pointer Buck gets word through his private wireless system that bird, he hidden a few feet away and instantly he freezes in a point (Plate II and pages 83 and 95). This is one of the best known dogs in America; his pictures have been widely used in national advertising.

This enthusiasm probably is not aroused by his near perfection in show points so much as by the way the red-coat strides around the great arena. Boy steps out like a major, carries his head high and actually pulls his handler along. The public likes to look upon action and invariably clerves it when an Irish Setter is on the move.

Happy-go-lucky, loyal and likable, the red Irishman is blessed with a winning personality as well as good looks and abounding vitality. In the field where

his job often demands toughness, durability, and courage, he is not found wanting yet he makes the most gentle and affectionate of companions. He lives to a ripe old age.

Many Irish Setters of olden times were not red, but white with red markings. Prizes still are offered in Ireland for white and red marked Irish Setters but such dogs are few. On the other hand, the all red setters are among the most popular dogs of the day.

The male Irish Setter should stand about 24 to 26 inches at the shoulder and weigh from 50 to 65 pounds. The color should be a rich golden chestnut with no trace whatever of black. White on chest, throat or toes or a small star on the fore

head or a narrow streak or blaze on the nose or face should not disqualify.

Gordon Setter

The Gordon Setter, a native Scot, is an uncommonly handsome dog, as useful as he is good looking. (Plate II.)

Tradition says that more than a century ago one of the Dukes of Gordon heard of a neighboring Highland shepherd's dog which was remarkably successful in locating game. He crossed this black and tan collie with the setters at Gordon Castle.

thus establishing the foundation of the breed, if this story is to be credited

Certain it is that Rake and Rachel, Gordon Setters bred by the Duke of Gordon in or about the year 1842 and brought to America by George W. Blunt, were white with black and tan markings, in contrast to those of the present day, which are coal black marked with tan

Mr. Blunt gave Rachel to his friend Daniel Webster and presented one of the puppies bred from the pair to Henry Clay. The acceptance of the latter offer was written from Washington, D. C., April 30, 1844. Clay wrote in part

'I have no great attachment for dogs, because they kill sheep, but some of my family like them better, and I sometimes overcome my repugnance to them, and get attracted by their fidelity. If it should be convenient to send the one you offer me to William A. Bradley, Esq., of this city, I will carry her with pleasure to Ashland and thank you for her. If convenient she ought to be here by this day week. I am truly and faithfully yours, H. Clay.'

This white, black and tan marked Gordon Setter evidently became a favorite. She or a setter very much like her appears in a portrait of Mr. Clay.

In the middle eighties a lighter, more finely built type of Gordon Setter arrived in the United States. These dogs, principally from Scotland, were owned and kennelled in the Kentucky Blue Grass country. Much more active than the older and heavier style of Gordon they proved excellent shooting as well as show dogs.

Hunting slowly but very surely, the Gordon is especially liked as a ruffed grouse dog and is also good on woodcock. He has nose, brains and a suitable temperament for training and is easily broken to retrieve.

A full grown dog should stand about 22 to 25 inches and weigh up to 68 pounds. The tan markings should be over the eyes, on the sides of the muzzle, on the throat and chest, on the inner side of the hind legs and thighs showing down the front of the stifle and broadening out to the outer side of the hind legs from the hock to the toes on the forelegs from the knees or a little above downward to the toes and around the vent.

A small white spot on the chest is allowed. The tan is a mahogany red, the main color a shining black.

Pointer

A first-rate bird dog, the Pointer is built on lines that suggest its speed and staying powers (Plate II and page 94).

Among the ancestors of this breed was the old Spanish Pointer, introduced into England early in the 18th century when the new practice of "shooting flying" with small leaden pellets was coming into vogue.

Old paintings indicate that the Spanish Pointer was a noble, sturdy, steady dog, but it did not prove fast enough for the game shooters of England. They wanted a gun dog not so much given to "pottering," or delay on the ground where game had been. So why not use the blood of a faster dog—aye, even the greyhound? Sure enough, with crosses of English Foxhound and greyhound blood there was brought forth a pointing dog that carried his head higher, he sought game scent from the atmosphere as well as from the soil.

The English Pointer was the result, and world wide is his fame. We find him in all countries, hot, cold, and temperate. So widely distributed is the breed that the "English" has been dropped and the dogs are known simply as "Pointers." In the America of our own day, in competition at field trials the Pointer has made an excellent record.

The Westminster Kennel Club, which sponsors the annual dog show at Madison Square Garden in New York, accomplished much for the benefit of breeders and users of Pointers in America, and a portrait of the Pointer, *Sensation*, remains the emblem of the club.

The best colors of Pointers are white and liver, white and lemon, and white and black, the white being the main or body color. The white not only gives a gay and aristocratic appearance, but is useful in the field, as it enables a hunter to see his dog some distance away.

Pointers vary in heights and weights, but the standard for a male is 50 to 55 pounds and 24½ to 25 inches, shoulder height.

German Short haired Pointer

The German Short haired Pointer of the present day in America is a particularly attractive common sense type of gun dog which promises to become more and more popular (Plate II).

Extremely useful and versatile this breed



© National Geographic Society

Painting by Edward Herbert Miner

AMPHIBIOUS RETRIEVERS FETCH GAME THEIR MASTERS SHOOT OVER WATER

A duck in its mouth a LABRADOR RETRIEVER trots up the beach while another sits near a yellow specimen of this breed, introduced into England by fishermen from Newfoundland. The CHESAPEAKE BAY RETRIEVER (left center and wading) is a native American. Its ancestors were two Newfoundland puppies, landed in Maryland from a wrecked English brig in 1807 and bred to local nondescript retrievers. These water dogs brave rough, icy waters, their coats resisting moisture like a duck's feathers.



© National Geographic Society

GOLDEN RETRIEVERS CAME FROM RUSSIA THE CURLY COATED ARE NATIVE ENGLISHMEN
 A troupe of Russian circus dogs performing in England in 1860 were bought by Sir Dudley Marjoribanks who later crossed them with the bloodhound and established the GOLDEN RETRIEVER breed (foreground and symmetrical). In Asia such dogs were often left all winter in sole charge of sheep. The Curly (center pair) of obscure ancestry is probably the oldest of all recognized retriever breeds. Its affectionate nature, muscular body, and crisp weather-resistant curls have endeared it to generations of lovers.

Painting by Edward Herbert Minter



© Stanley M. Ballance

PRIDE OF THE KING'S KENNELS AT SANDRINGHAM

A splendid specimen of the Labrador Retriever was the late King George V's prize winning Sandringham Snow, here displayed by the monarch's head kennel man. The royal dog's shining black coat proclaims his excellent health and condition. On occasion it serves as a natural raincoat, allowing drops to run off without wetting the skin (Plate IV and page 107).

not only is highly proficient at locating and pointing game birds but can trail animals at night like a hound and retrieve from land or water. It has been developed in relatively recent times from the old or home-bred German Pointer and the faster type owned in the United States.

The old German Pointer came from the Spanish Pointers imported into Germany and crossed with home-bred bloodhounds. The English had crossed their Spanish dogs with foxhound and even greyhound blood (page 93). But the Germans desired dogs

which would not only point game birds in the day time, but run on the scent of an animal at night. They sought keen scenting powers rather than speed.

About 50 years ago, when field trials became popular in America, Germans and other Continental European sportsmen residing in this country soon became interested in the greater speed of the American bred Pointer mostly of English origin which was able to run rings around the heavier, pure bred German Pointer.

Why not cross the German Pointer with the English Pointer they mused and in that way bring about the production of a faster dog for game bird shooting purposes and one whose sensitive nose would not be seri-

ously harmed? The new variety would still retain not only its great olfactory powers but a good deal of the hound voice or tongue for night hunting.

The experiment was tried and the resulting bird dog by day and hound dog by night has become popular especially in the Middle West.

In the now well established and recognized breed there is a double cross of old Spanish Pointer with 25 per cent English Foxhound and 25 per cent bloodhound. Can there be any wonder that the German

Short hair has exceptionally good scenting powers?

However, it is recommended that this dog be broken to point birds before he is taken out on night hunting, because it is very likely that one possessed of so much hound blood would rather hunt animals than birds. He prefers the stronger scent on the ground.

The color that predominates in this dog is liver or brown. He may be solid liver, liver and white spotted, liver and white spotted and ticked, or liver and white ticked. Any colors other than liver and white are not recognized. The tail is docked and the coat is short, flat and firm. A male may stand 23 to 25 inches and weigh 55 to 70 pounds. Females, of course, are smaller.

Cocker Spaniel

The Cocker, smallest of the sporting spaniels, is an exceptionally lovable dog with a nature as kindly as its countenance (Plate III).

A native of Britain, it was given its name because of its excellence for use in woodcock shooting. Today it is widely popular both as a sportsman's dog for the outdoors and as a pet for the children at home. No dog, I believe, has a temperament more equable and affectionate.

Of all the shooting dogs none is so widely distributed the world over. There are more Cocker Spaniels registered in the kennel clubs of all countries than any other sporting kind—proof of the enormous popularity they enjoy among dog lovers of all nations.

Many Cockers are black, and on delving into the long lines of ancestry one finds that these have descended from the larger black Field Spaniel (Plate III). The large puppies of a Field Spaniel litter were called field, while the small ones were designated cocker because they were not expected to retrieve anything larger than a woodcock.

Nowadays the Cockers used for sporting purposes are being bred longer in leg and more powerful in jaw, for at field trials they are called upon to retrieve all sorts of game birds.

The future probably will see considerable crossing of the stronger leggier English bred Cocker with the superlatively beautiful American bred Cocker, usually of less weight, height and consequent power. The progeny should prove entirely satisfactory as sporting Cocker Spaniels.

American bred Cockers are portrayed in Mr. Miner's painting (Plate III).

The Cocker Spaniel may be self-colored—black, liver, or red, or parti-colored, including combinations of blue roan, liver roan, lemon roan, red roan, black and white, liver and white, lemon and white, black, tan, and white. The American bred Cocker weighs from 18 to 24 pounds, the English bred 25 to 30 pounds.

Field Spaniel

A well made dog is the present day Field Spaniel, another of the varieties produced in Britain. He is a good hunting comrade as well as a handsome fellow, usually ideal in disposition and a capable retriever from land or water (Plate III).

As a show dog during the late Victorian period, the Field Spaniel like the Sussex Spaniel, was bred so that its body might be long and its legs short. High prices were paid for specimens of exaggerated length and lowness.

But with the coming of field trials for spaniels, the comparative uselessness of the extremely low set working dogs was apparent to all. The style in breeding underwent a decided change and the fields became longer in leg and more compact in body. They are usually black.

The show male Field Spaniel of today stands about 18 inches at the shoulder and scales around 35 to 50 pounds.

Sussex Spaniel

The Sussex Spaniel is named for the County of Sussex in the southeast of England, where it was used for hunting pheasants and other game in a terrain of field, farm and woodland (Plate III).

In common with the Field Spaniels and even the Cocker Spaniels of the time, the Sussex of the late Victorian era was bred very long in the body and very short in the leg—a build altogether unsuitable for the activity and lasting powers a working spaniel must possess.

Today the Sussex is produced with longer legs while the length of the body has been shortened. It has a tractable disposition and makes a sensible, hard working pheasant, woodcock, ruffed grouse and rabbit shooting dog. In America this breed is seldom seen.

The rich golden liver coat marks the purity of the Sussex Spaniel's blood. He should weigh from 35 to 45 pounds.



© National Geographic Society

ENGLISH SPRINGER SPANIELS ARE NAMED FOR THEIR OCCUPATION; CLUMBER SPANIELS FOR AN ESTATE OF THE DUKES OF NEWCASTLE. Instead of pointing, the "springing spaniels" (pair with dark markings) flush or spring their game, startling it into sudden flight so hunters may shoot. Increased pleasant breeding in America stimulates demand for these efficient dogs. Heavier, more sedate CLUMBER SPANIELS, white with lemon or pale-orange markings on head and ears, are well liked because they hunt without barking. Here one bears a dead rabbit to its master.

Painting by Edward Herbert Miner



© National Geographic Society

WATER DOGS ALL ARE THE IRISH WATER SPANIEL, WIRE-HAIRED POINTING GRIFFON, AND FLAT-COATED RETRIEVERS. The latter of the spaniel family in appearance, the topknotted son of Erin (left) was developed in the 19th century, mainly by Justin McCarthy, whose breeding methods remain a secret. E. K. Korthals, a Netherlander, began to breed the WIRE-HAIRED POINTING GRIFFON (right foreground) about 1874. Though now rare in this country, FLAT-COATED RETRIEVERS (pair in background) are descended from two North American breeds, the Labrador Retriever (Plate IV) and the St. John's Newfoundland.

Painting by Edward Herbert Miner

Chesapeake Bay Retriever

In 1807 a vessel flying the British flag was wrecked off the coast of Maryland. The crew was rescued by the American ship *Canton* and among the refugees were two puppies from Newfoundland. The male—destined to be the Adam of a new breed—was a light liver or dingy red in color, the female, black.

The young dogs were presented by the master of the abandoned brig to his new American friends. When the puppies grew older they were found to be very tractable and good retrievers—just the sort of dogs required for duck shooting along the shores of Chesapeake Bay.

These newcomers probably had been bred in Newfoundland of a stock introduced by early English, French, and Basque fishermen and other sailors. A ship's dog in those days had to be a powerful fellow, an able bodied canine sailor not afraid of the roughest and coldest seas. The rocket apparatus then was unknown and the ship's dog was the ship's swimmer. In case of a wreck he was often called upon to swim ashore with a light line, for he might survive where no small boat could live amid the breakers and rocks.

From such sturdy stock, then came Sailor and *Canton* as the rescued puppies were called. Bred with the local Maryland dogs and perhaps with each other, they produced a mighty and exceedingly useful race of wild fowl and game retrievers, fearless of winds and waters—the Chesapeake Bay Retriever (Plate IV and page 84).

Today this American breed is not only rightfully popular and much prized among duck hunters throughout the United States and Canada but also has improved in appearance and recently has been introduced into the home of dog shows—England.

Furthermore the Chesapeake is proving its worth as a retriever not only of water fowl but of upland game as well.

With its naturally well oiled and thick hide, hard weather resisting coat and woolly or furlike under-coat the Chesapeake Bay dog can defy the most extreme conditions of winter weather.

As the duck shooter's dog must not be readily visible to the ever wary wild fowl, the color of the Chesapeake is considered of the utmost importance. It varies from a dark brown to a faded tan or dead grass shade. A little white is allowed on the chest, the less the better.

Males should stand 23 to 26 inches and weigh from 65 to 75 pounds, females 21 to 24 inches and 55 to 65 pounds in weight.

Labrador Retriever

The ancestors of the present day Labrador Retriever came not from Labrador but from Newfoundland. They were generally known as St. John's dogs and were highly valued for sporting purposes (Plate IV and page 98).

'Their sense of smelling is scarcely to be credited,' wrote Colonel Hawker, an English sportsman author, in 1830 "and their discrimination of scent in following a wounded pheasant through a whole covert full of game, or a pinioned wildfowl through a furze brake or a warren of rabbits, appears almost impossible."

In this respect the Labrador has changed not a bit. His scenting powers are as phenomenal today as they were a century ago. In England a pointer cross was used.

In the ever increasing number of field and water trials held in the United States and Europe the Labrador has more than ever proved himself a highly reliable dog for pheasant and duck shooting.

In most instances the Labrador is kept only for retrieving, as he is considered too high at the shoulder and too bulky in body to enter readily the dense coverts or thickets that a spaniel would penetrate with ease. Labradors are used as rough all round shooting dogs, however, when a pointer, setter, or spaniel is not available.

Hunters usually take a Labrador along while marsh shooting and in some cases where there are plenty of rabbits. His nose steadiness, and sagacity make him easy to handle in the field. He is the hunter's friend and also a handy watchdog.

The color is usually black, free from rustiness and white markings except perhaps a small spot on the chest. Other whole colors are permissible and yellow is becoming increasingly popular. The blacks have dark eyes.

The coat is short, dense, thick, and fairly hard to the touch without wave. The tail, known as an otter tail is distinctive. It should be straight and not carried over the back.

The Labrador's height at the shoulder is about 21 to 22 inches. Males weigh from 60 to 65 pounds, females around 55 pounds.

Curly-coated Retriever

Curly-coated Retrievers were exhibited at Birmingham, England, as long ago as 1860, and to this day they remain among the most useful and well made of the gun dogs employed for field and water work (Plate V)

The "Curly" fully deserves his name, as the entire body is covered with close, crisp curls of hair which probably protect the hide from the rigors of cold and water.

From whence came this very old breed of retriever? Possibly from some kind of a curly haired spaniel and a pointer of black or liver color. It has sometimes been thought to have some Irish Water Spaniel blood, but I believe that the Curly coated Retriever was in existence before the Irish Water Spaniel in its purity as we know it now was known anywhere (page 106).

The color of this dog is wholly black or liver, but a few white hairs are allowable in the chest. The coat should be a mass of crisp curls. A feature of this breed is the moderately short tail, carried fairly straight, slightly tapering toward the point and covered with curls.

Recently the Curly coated Retriever was reintroduced into the United States for shooting and field trial purposes. The male should stand about 24 inches and weigh around 65 to 75 pounds.

Golden Retriever

About the time of the American Civil War a traveling showman in Russia was struck by the intelligence and impressive appearance of the massive cream or biscuit-colored dogs of the Caucasus which were chiefly used for guarding sheep. He tried training some of them and produced a striking troupe of performing dogs.

When they appeared at a circus at Brighton, England shortly afterward the splendid animals caught the eye of the late Lord Tweedmouth—Sir Dudley Marjoribanks—who persuaded the proprietor to sell him the lot. From such ancestry comes one of the handsomest, most sagacious, and amicable of dogs—the modern Golden Retriever (Plate V).

The Golden Retriever was first seen at dog shows about 1908, and at field trials in 1910 and 1911. Since then he has become more and more popular in America as well as in Europe. Some of the earlier specimens were imported by a resident of Winnipeg, Canada and were satisfactorily tried

as duck dogs under the most severe winter conditions. The Golden proved themselves as hardy as any of the other retrievers and large spaniels.

The coat is flat or wavy, with a good under-coat, and both are water-resisting. Light-colored eyes are considered objectionable, black or brown ones are preferred. The skull is broad, the muzzle powerful, the teeth strong.

The very appearance of this dog gives one the impression of kindness, understanding, and faithfulness, it is a dog for the country house as well as the field.

The male is about 24 inches in height and weighs around 68 pounds, females less.

English Springer Spaniel

This dog, the largest of the land spaniels, was given its name because it springs or drives out its game, generally pheasants, ruffed grouse, woodcock, or rabbits, that find shelter in patches of cover (Plate VI).

The English Springer, which "jumps" its game and the English Setter (Plate I), which quietly points toward it had a common origin. But the spaniel is allowed to follow its natural bent, while the setter must restrain itself from running in, or "chasing." The setter is better fitted for speed than the spaniel, which is built on more cloddy lines.

The springer spaniel is one of the earliest, if not the very oldest, of the spaniel varieties. Barlow's print (A.D. 1686) presents springer spaniels which have just sprung winged game—apparently pheasants—that are being shot at by gentlemen mounted on horses. The English Springer, in appearance and use, has not changed for at least 250 years.

Hardy and possessed of a natural desire for hunting, the springer is also a capital water dog and retriever.

My own English Springer Spaniel Roger, is 15 years old. His hearing has gone and his eyesight is affected, but any man—even a stranger—has only to show his gun to the dog and Roger's old hunting enthusiasm is at once aroused.

Since 1922 springer spaniels have become highly popular as working spaniels in the United States and Canada. Attractive in appearance and gentle in disposition, they are also recommended as house dogs.

English Springers usually have white as



© National Geographic Society

Painting by Edward Herbert Mearns

ELONGATED DACHSHUNDE ARE THE DOGS SOLD BY THE YARD

Sturdy DACHSHUNDE (from *dachs* badger and *hund* dog) have long been used in the native Germany for hunting badgers, foxes, and other ground animals. With short and strong forelegs to facilitate burrowing, the courageous little dogs follow game underground and bark to tell the hunters where to dig. Alert, companionable pets, they are among the most popular breeds in America. Here two smooth-haired pups (at top) gaze down on a long-haired pup (center), a smooth dog (lower left), and a wire-haired specimen (lower right).

the predominating color with markings of liver black liver and tan tan or roan

Males should weigh about 45 pounds and should not exceed 50 pounds females about 42 pounds and not over 47 (These figures are those approved by the English Springer Spaniel Field Trial Association of America) Americans like their springers about 18½ inches at the shoulder, while the English do not object to a 20-inch standard and a weight of 50 pounds

Clumber Spaniel

Sometimes known as 'the aristocrat of the spaniel family', this dog takes its name from Clumber Park a country seat of the Dukes of Newcastle near Worksop in England (Plate VI)

Originally the Clumber was a French spaniel brought to a high state of hunting perfection by the Duc de Noailles in France but about the middle of the 18th century he presented several of his dogs to the then Duke of Newcastle

Easily trained and possessed of keen scenting powers they were and are silent or mute hunters—they spring or push out their game without giving tongue Thus whatever game may be the object of the shooting party is not unduly disturbed until the arrival of the dogs and guns

In due course the strain from Clumber became sparsely distributed about the British countryside But generally the Clumber was looked upon as one of the apertinences of the larger kennels and pheasant shooting estates owned by persons of the highest rank including the reigning monarch and his nobles hence its aristocratic reputation Even today the Clumber Spaniel is regarded as a sort of royal dog and one to be worked in a team rather than singly

A team of ten or more Clumbers working abreast like an advancing line of soldiers is a sight to behold They are steady and not too fast for the following guns Every head of individual game—feather or fur—is found and all the dogs are broken to drop to wing or shot The nearest Clumber to the fallen game retrieves it and thereupon the field moves on The method is complete almost military

For at least three reigns Clumber Spaniels have been popular at Sandringham the English country seat of the Kings of England The Sandringham Clumbers have been the pride of Edward VII

George V and the present monarch It was Queen Alexandra as Princess of Wales who made them known to the general public by sending them to the leading shows all over the country

The earliest of the Clumbers to arrive on the American Continent belonged to officers attached to British regiments in the Maritime Provinces Today there are few of the breed in the Dominion

The Clumber is usually a long bodied dog with shorter and stronger legs than those of the springer He is heavy and for his size unusually full of movement with the swaying hindquarters and merry tail carriage of the good tempered dog

The color is plain white with lemon colored markings about the head this shade being preferred to orange The herd markings are slight and the muzzle is freckled with lemon tickings A male may weigh as much as 65 pounds and a female 55 pounds

Flat coated Retriever

This is another of the valuable retriever breeds developed from the water dogs brought to Britain from Newfoundland (Plate VII)

In the making of the Flat coated Retriever setter blood was crossed with the imported stock while in the development of the Labrador (Plate IV) a pointer cross was used instead The two breeds are used by sportsmen for almost identical purposes but the Labrador is far more numerous and popular In fact the flat coated kind is seldom seen in America at present One of the chief supporters of the breed in this country was the late Mr George Jay Gould

In England the Flat or Wavy coated Retrievers as they were then known were first presented for public view at the show held at Birmingham in 1860 They were much larger and coarser than those exhibited a few years later

The Flat coated Retriever flourished as a show dog in the late eighties and early nineties and a subsequent decline in its popularity has been attributed by some to the introduction of Russian Wolfhound blood by certain breeders This was done in an effort to produce a longer jaw better fitted for carrying a hare or pheasant but the result was a long narrow coffinlike head

In recent years this effect has been eliminated and these handsome intelligent and affectionate dogs have regained some of their old time favor in England

The standard calls for dogs of 60 to 70 pounds. The color is black or liver.

Wire-haired Pointing Griffon

The Wire haired Pointing Griffon, an extremely useful gun dog, was developed by a wealthy Netherland banker's son E. K. Korthals, who deliberately set out in 1874 to produce a new sporting breed (Plate VII).

It proved to be an excellent pointer and retriever possessed of a first-class nose. This is not surprising, since the breed is believed to include the blood of the otter hound and setter, also, very likely, that of the pointer and some of the larger land spaniels.

The wire haired and sometimes rougher-coated sporting griffons have been used considerably as pheasant and other upland game shooting dogs in this country. The largest kennels were jointly maintained by Mr. Louis Thebaud, of Morristown, New Jersey, and the late Mr. Erastus T. Tefft, M. F. H., Brewster, New York.

The close and wirelike coat of the griffon is ample protection against the rigors of an exacting winter climate. Therefore, as a duck hunting dog the griffon is particularly well-equipped for retrieving from the water. As a wide ranging dog for quail, Hungarian partridge, and other outlying game, he will not be found so fast afoot as the pointer or setter. He may be described as slow but sure.

The coat of the Wire haired Griffon has been officially described as harsh 'like the bristles of a wild boar' and his appearance notwithstanding his short coat, is as unkenp as that of the long haired griffon. However he has a very intelligent air.

The color is steel gray with chestnut patches, gray white with chestnut splashes, chestnut, dirty white mixed with chestnut—never black. The nose is always brown. Males stand from 21½ to 23½ inches and females 19½ to 21½ inches. Full weight about 56 pounds. The tail is generally cut to a third of its length.

Irish Water Spaniel

A first-class water dog developed in Ireland, this spaniel looks as if it had borrowed spare parts from several breeds (Plate VIII).

Up to about the middle of the last century, there were two varieties of the water spaniel in Ireland. Those of the north had

considerable white mixed with the liver shade. In the south a wholly liver colored race was developed by Mr. Justin McCarthy, and this is the variety that has grown into the fully recognized and highly characteristic shooting and show dog of our times.

The breeds used in its making were not divulged, but this dog had the ears of the spaniel or large poodle, the curled or half fluffed-out coat of the Old English water dog or wild fowl retriever (a breed now extinct), clean cheeks and muzzle, and the three-quarter stinglike tail of the English Pointer.

No one could fail to recognize the Irish Water Spaniel. He stands alone, a unique breed. Where else can you find a very heavily coated dog with the face and lips covered with short hair and a tail that grows no feather underneath?

In the roughest and coldest of salt or fresh waters the Irish Water Spaniel is in his element. As a duck shooter's dog he is used in this country from the Atlantic to the Pacific. There are some who employ him as a land spaniel, but here his size is a handicap to rapid progress through dense covert and thicket. As a marsh dog he is excellent.

McCarthy liked the males from 21 to 22½ inches high, the head rather capacious, forehead prominent, face from eyes down perfectly smooth, and the ears from 24 to 26 inches from point to point.

'The head,' he wrote, 'should be crowned with a well-defined topknot not straggling across like that of the common rough water dog, but coming down in a peak on the forehead. The body should be covered with small, crisp curls which often become clogged in the moulting season. The tail should be round without feather underneath, rather short, and as stiff as a ramrod, the color, a pure puce liver without any white.'

'They will not stand a cross with any other breed,' he added, apparently feeling that they had already acquired enough assorted characteristics.

Dachshund

One of the most popular of all the European breeds is that distinctive little German, the Dachshund (Plate VIII).

In English its name means 'badger dog' as this exaggeratedly low, short legged breed was particularly suitable for



Photograph by H. Armstrong Roberts

WHEN A FOUR-FOOTED FELLER NEEDS A FRIEND

Charlie Mink, professional shot and dog trainer, stops to remove a sandbar from an English Setter's paw while shooting near Williamstown, New Jersey. At his feet rest two other setters, one English, one Irish (Plate I). In places where burs are particularly bothersome, bird dogs are sometimes equipped with lace-up boots of soft leather to protect their feet.

invading the badger's "sett" or "earth," as their burrows are called. It was not expected to nip the quarry, however, but merely to hold the formidable, hard-bitten creature at bay and bark so that men could dig him out.

In Germany years ago I saw Dachshund trials in which a badger was released in a maze of artificial burrows—tunnels roofed with boards. When one of the dogs set up a barking below, the board above him was raised and the judges could see whether he was telling the truth or giving a false alarm.

In addition, the Dachshund has been used

for "going to earth" after foxes and has served many generations of German sportsmen as a general hunting dog for driving rabbits or other game from cover. It combines, in a measure, the work of the hound, the terrier, and perhaps the spaniel. While running on the scent of a badger, rabbit, or other animal, the Dachshund gives tongue.

Some believe that the Dachshund was known in the East long before the Christian Era. Egyptian and Assyrian sculptures, some of them before 2000 B. C., depict a dog much after the Dachshund's make and shape. At the court of King



Photograph by H. Armstrong Roberts

A CASE OF MISTAKEN IDENTITY

No wonder the Dachshund puppy looks sad! His eyes told him he had found a new playmate and now his unerring nose brings word that it was all a mistake and the thing is just a lifeless toy

Thothmes III such a dog was favored but whether he was used as a hunting dog or for turning the roasting spits of those times is not known

One of the chief patrons of the breed is the former Emperor of Germany, who several years ago presented a representative team of smooth hairs to the then King of Siam

Today the three varieties—the smooth long haired, and wire haired—are among the most sought after bench show dogs in the United States Rabbit hunting field trials for the breed are now held in New York New Jersey, and elsewhere

Less than three decades ago a large number of show Dachshunde had crooked fore legs today only the straight legged seemingly are desired

The coat of the smooth variety should be short dense and smooth In wire hairs the whole body is covered with an even, short rough coat but with finer, shorter hairs distributed between the coarser ones The long haired variety has a soft and straight or slightly waved shining coat

Weights vary from 5 to 35 pounds The English standard does not exceed 25 pounds The German standard is in three

classes $15\frac{1}{2}$ to $16\frac{1}{2}$ pounds over $16\frac{1}{2}$ to 22 pounds and over 22 pounds The maximum weight of the dwarf variety is $8\frac{1}{2}$ pounds Color black, gray, red, or yellow in good harmony much white is objectionable

NOTE—THE NATIONAL GEOGRAPHIC MAGAZINE wishes to acknowledge the kind cooperation of those persons who have made available their splendid dogs as models for Mr Miner's paintings notably the following Mr Anthony Bliss and his Superintendent Mr Arthur Buchan for models and information in connection with the Chesapeake Bay Retrievers Miss Priscilla St George whose champion English Setter was the model Dr Murray Maxwell for the excellent specimen of the Irish Water Spaniel and Mrs F J Spruyt for models of the somewhat rare Wire haired Pointing Griffon Miss Jean Hollins for her blue ribbon Golden Retriever and Mrs Herbert L Bodman for her yellow Labrador of Mr Marshall Fields breeding Mr John Littlejohn for the perfectly marked Gordon Setter Mr George Bancroft for the specimen of the German Short haired Pointer Our main figure of the Labrador is the international champion owned by Mr Jay F Carlisle The artist himself owns the Irish Setters For these models he says we just whistled

UGANDA, "LAND OF SOMETHING NEW"

Equatorial African Area Reveals Snow-crowned Peaks, Crater Lakes, Jungle-story Beasts, Human Giants, and Forest Pygmies

By JAY MARSTON

THE huge silver air liner circled above the shore of Lake Victoria banked for a turn seemed to glide down an invisible chute to the tufted grass of the Intebbe airdrome and landed bumpily to the concrete strand opposite the resthouse.

A score or so of passengers—business men bound for the Cape, one or two Government officials returning from home leave, a coffee planter in English peer going to his estates in Kenya, some sightseers, a female lepidopterist, and the members of a Commission to inquire into something or other—climbed down the ladder glanced curiously at the blue lake and the grassy plain about them and made for luncheon.

AIRPLANES SUPPLANT CANOES AND DHOWS

So simplified has travel become now, days that they had no particular sense of wonder at having reached in five days from London a country which only a few decades ago no European had traversed.

Uganda made a tardy appearance on the map of what used to be called the

Dark Continent. Indeed authentic records of its history began only when J. H. Speke with his companion J. A. Grant reached the court of Mutesa, the Kabaka of Buganda, in 1862. Later in the same year Speke discovered Ripon Falls, source of the River Nile, on Lake Victoria (page 120). Previously Arab traders and slavers had penetrated as far as Uganda in their raids from the east coast.

When the first missionaries in response to Henry M. Stanley's famous appeal in the *Daily Telegraph** came to the shores of the Great Lake, some sixty years ago, the journey took all of six months. They walked up from the coast with their food and kits borne on the woolly heads of Swahili or Wanyamwezi porters, or on the backs of Isabella-colored pack donkeys.

* See Great African Lake (Victoria) by Sir Henry M. Stanley, NATIONAL GEOGRAPHIC MAGAZINE May 1902.

The crossing of the vast and perilous waters in those days was made in canoes of sewn planks, sketchily equipped with broad-bladed paddles, some gourds for buoys, and propitiation to the gods in the form of a few fluttering rags or plantain leaves at the prow (page 117).

Small dhows of the Arab pattern also were used.

These early arrivals in Uganda had faced in their journey inland all sorts of perils—drought and torrential rains, fevers, and man-eating lions that prowled by night round their camp, hostile tribes, and like storms of extraordinary violence.

Nowadays visitors to Uganda descend from the twice weekly air liner which has carried them swiftly southward over the spacious desert and swamp and forest of Egypt and the Sudan, just as nonchalantly as they might from the Blue Train on the Riviera.

They spend a few weeks perhaps in seeing the little Protectorate of some 94,000 square miles that lies southwest of Ethiopia, wedged between the Belgian Congo, the Anglo-Egyptian Sudan, Tanganyika, and Kenya. Lake Victoria is to the south, the Nile to the north, and the Ruwenzori with their eternal snows to the west.*

They go hither and thither in automobiles stopping to photograph the beauties of its tropical richness, the wonders of its wild life, its interesting brown peoples, and noticing the marks civilization has made upon it in half a century.

HUMAN HOME PLANTS BEDDED IN A TROPICAL GARDEN

There are rather fewer than 2,000 European residents—Government officials, planters, professional and commercial men, mining prospectors, and their wives and children—living in Uganda, and most of these look to the time when they will return to their own country.

* See map, page 113, and Special Map Supplement of Africa, NATIONAL GEOGRAPHIC MAGAZINE, June 1935.



TOM TOMS BEAT A WEIRD TATTOO TO HONOR THE MUKAMA

© A. T. Schofield

At the courts of Toro, Buganda and Bunyoro, mukamas herald every activity and ceremony with rapid tapplings on the taut ovuhde drums, and by screeching refrains on horns. Native affairs are regulated by the kings and their council, but serious matters and trials involving foreigners are handled by British courts.

They are home plants bedded out for a time in a tropical garden. They know that they are aliens in a smiling but strange land, and that no amount of roads and railways and airways of telegraphs and mines and public works will ever really make of Uganda a white man's country.

I saw things I shall never forget all my life: jungle story beasts, elephants, hippos, rhinos, giraffes, and crocodiles; * pygmies from the primeval forest; slim giants nearly seven feet tall with profiles like those on Egyptian frescoes. I recall lovely silver lakes and giant volcanoes, deep crater lakes green and mysterious, old Nile flowing placidly or hurling itself headlong over magnificent falls, snow on the Equator grass that grows high above your head rustling bamboo forests.

In a visit of two or three weeks Uganda can show all these. There are good hard roads, albeit narrow and twisting in parts all over the land, even up among the bam-

boo forests and volcanoes. There are comfortable lake steamers (page 122).

In October, during the season of the short rains, the whole country is as green as if it had been drenched in *creme de menthe*.

Entebbe, seat of government, lies curled round the lake shore in a green amphitheater shaded with huge old trees, domed mangoes and flame-flowered tulip trees (we call them flame of the forest), scarlet flamboyant blue jacaranda, incense and fig trees, and that fine timber tree, the tall *mutuli* or African teak.

Above Government House, a hybrid piece of architecture which stands hidden amid lovely trees on the crest of a hill, the Union Jack flutters bravely from daybreak to sundown.

A BRAVE SHOW OF BIRDS

The peninsula on which Entebbe stands is a favorite resting place for migrating birds. Probably no other spot in the Protectorate has such a brave show of birds swooping and fluttering from tree to tree—yellow weaver birds, shrikes, scarlet and black honey-suckers, flashing blue king

* See "Where Roosevelt Will Hunt" by Sir Harry Johnston, *NATIONAL GEOGRAPHIC MAGAZINE*, March 1909; and "Wild Man and Wild Beast in Africa" by Theodore Roosevelt, January 1911.



Photograph by Sir Bernard Bourdillon

SWIFT AND DEADLY IS THE RHINOS CHARGE

Surprisingly active despite their bulky bodies, rhinoceroses sometimes rush from ambush to attack both white hunters and natives. The animals use the horns which may grow three feet long, as battering rams in battle and for digging out edible roots. Many live in the thornbush along the Nile north of Lake Albert.

fishers, starlings, jays, swallows, wagtails, and chats.

A full chorus of twittering and song heralds the dawn here, and the honking of golden-crested cranes, flying to their roosting place in some tall *muwuli* tree, breaks the quiet of evening. Crows in clerical black and white squawk in the gardens, gray herons and white fish eagles brood at the lake's edge, and hawks wheel and hover all day against the milky blue of the sky.

Entebbe, with its golf course and club, its bungalows and offices hidden among trees and shrouded in flaming bougainvillea and golden shower, its Secretariat where the Governor and his Legislative and Executive Councils meet, is a charming dead-end. A faintly holy calm broods over the town, and there is only one road out of it—the road to Kampala, the bustling commercial capital (page 113).

A CROCODILE FILM STAR

This good red *murram* (lateritic iron stone) highway was broad, and bordered with wild date palms, fruit laden mango

and wild fig trees, emerald grass 14 feet high, flame trees, raphia palms, occasional rubber and coffee plantations, cotton and mealie and *mulugo* patches, and the ubiquitous banana groves which provide the people of Buganda with their staple food, *mtoki*, or plantain.

At a spot called Mile 13, the lake came to view again, sapphire set in the emerald of papyrus swamp and forest. A rough road turns off to a village on the lake shore.

Here lives the famous crocodile, Lutembe, who has starred in a Cherry Kearson film, answers to her name, has been photographed about as often as Greta Garbo, and has only once in her life harmed a human being, a native woman whose arm she took off (page 116).

That regrettable incident the primitive people regarded with complete approval as they had brought the woman to Lutembe to be judged on a charge of theft.

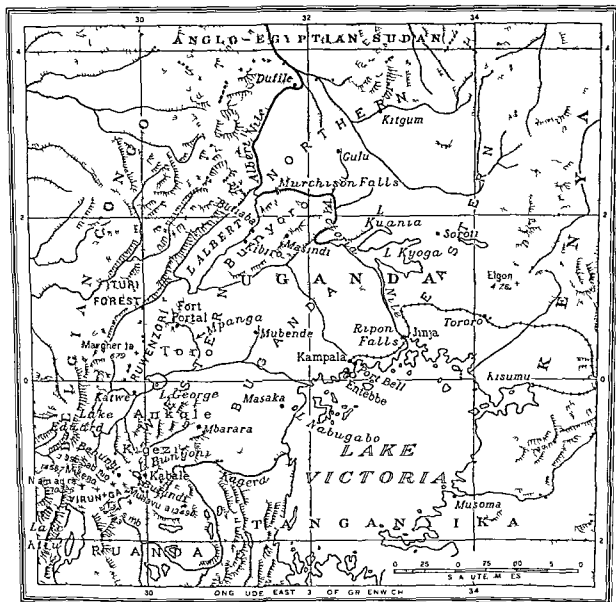
Nobody knows Lutembe's age. The native ancients will mutter of fifty or a hundred years, but it was only a few years ago that her strange friendliness became generally known and she developed into a



MAKE WAY FOR HIS HIGHNESS THE KING OF TORO!

© A. I. S. Hoff

Courts always lay down a matting carpet for the Mukama or native ruler who wears a long ceremonial beard of colobus monkey hair and walks beneath the royal parasol. He must pass through seven huts in this ceremony when he is crowned anew each February. Even in the milking of his cattle a special ritual is observed (pages 125 and 127). Although the Mukama follows traditional rites he is a progressive monarch who once served as an officer in the King's African Rifles.



**UGANDA BORDERS THE LARGEST FRESH WATER LAKE IN THE OLD WORLD AND
CONTAINS THE SOURCE OF THE NILE**

Pearl of Africa the famous explorer Sir Henry M Stanley called this Protectorate astride the Equator alongs de Kenya Colony in British East Africa. Of its more than three and a half million population only about 2000 are European. From Lake Victoria's north shore at Jinja pours the Nile Egypt's life stream. Prosperous Uganda's chief export is cotton but sugar coffee ivory and tin ore also are sent overseas.

mine of riches for the villagers who had fed her with fish for years.

It is amazing to see them wading into the water beside her and coaxing her to come waddling ashore and catch a piece of putrid mudfish (which they have sold to some incredulous visitor for two shillings) with a stupendous clap of her frightful jaws.

Since her stardom the astute villagers have blossomed out into new huts bicycles European hats coats and boots. They look upon Lutembe as their village deity.

One or two nasty brutes that lurk with

sinister patience round the shore are said to be her offspring but the natives do not credit them with their mother's manners, though they are said to be attempting to train one of them to take her place in the event of her demise. In the spring, Lutembe goes off to mate but she never fails to return.

Thirteen miles beyond the village we ran through spinneys of eucalyptus gum planted for anti-malarial purposes into Kampala past the station of the Kenya and Uganda Railway, through the squalid



Photograph by Alice Schalek

REED FENCES AROUND THE KING'S PALACE ARE NOT FOR PROTECTION BUT
INDICATE ROYALTY

Sir Daudi Chwa's new home crowns Mengo hill one of Kampala's eminences and is built in European style. Many ancestors of the present Kabaka have ruled here. Most famous of them was Mutesa who held sway when the first explorers arrived. His tomb near by is still watched over by female descendants (page 116).

Indian bazaar, and into the main streets.

These are a strange mixture of the squalid and the smart. Barclay's beautiful white bank is cheek by jowl with the tin-roofed *dukas* of Indian shopkeepers, who sit in their doorways chewing betel nut and spitting a circle of crimson around them. The handsome High Courts of Justice look over more of these tin-roofed atrocities.

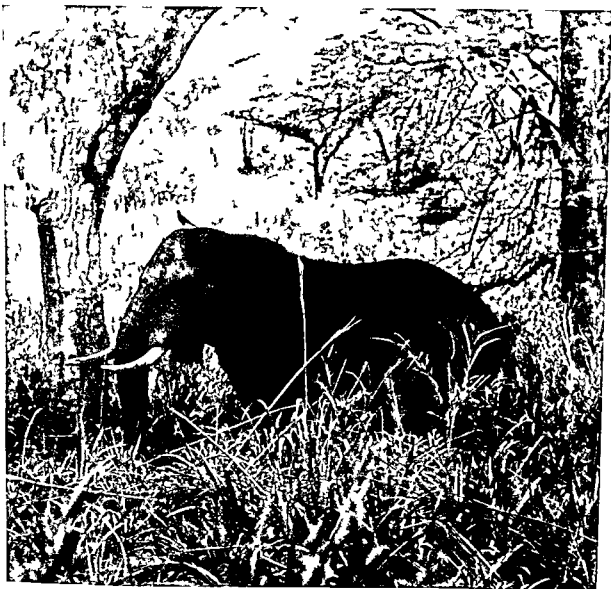
Shining cars glide along the roads, dodging pedestrians and cyclists, a hamali cart, loaded with timber or junk, is pulled along by half a dozen natives who chant and sweat as they haul and shove. A native chief passes in a shining saloon

(English for sedan), three half-naked porters from Ruanda, Belgian Congo, casual laborers, wander along gaping vaguely, with their belongings on their heads and their knobbed sticks held aloft like spears.

A town of anomalies, Kampala!

All about it are flat-topped green ridges. On one hill is the palace of the native king. His Highness the Kabaka, Sir Daudi Chwa, K. C. M. G. (p. 118). He is the grandson of that famous Mutesa who received the first missionaries (p. 109).

A native monarchy, with a feudal system of government, existed long before the white man came.



Photograph by Sir Bernard Bouillon

JUMBO HAS A FRIENDLY GROOM TO SCRATCH HIS HEAD

While the old tusker takes a noonday siesta in the shade the bird picks insects from his thick wrinkled hide. The Bunyoro and Gulu Game Reserve northeast of Lake Albert and embracing Murchison Falls (page 124) is a living natural history museum so numerous are the wild animals within its boundaries.

Mwanga, who succeeded Mutesa was a cruel and vacillating ruler. He found himself involved in the struggle for supremacy of Anglican Catholic and Mohammedan and allied himself with his hereditary enemy the Mukama of the neighboring State of Bunyoro.

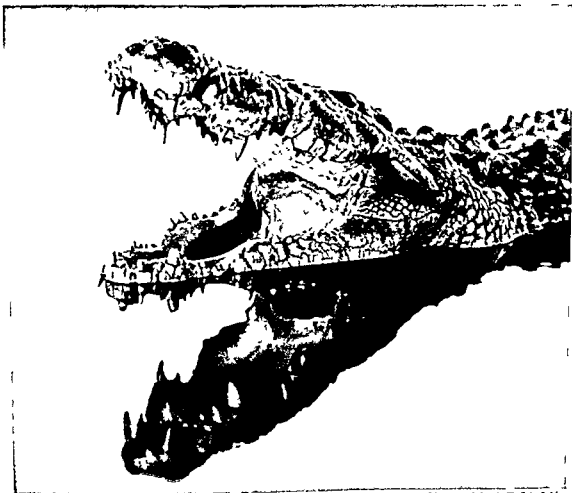
In 1890 he made a treaty with Captain (now Lord) Lugard representative of the Imperial British East Africa Company of traders. However such was his treachery that the latter was forced to defend his life in the fort on the old Kampala hill, where the British flag was first planted.

In 1894 part of present day Uganda was declared a British Protectorate by 1902 a

railway reached from the east coast to the lake shore and in 1900 after the Kabaka Mwanga had been captured and a mutiny of the Sudanese troops suppressed Sir Harry Johnston drew up the Uganda Agreement.

Buganda still is recognized as a native kingdom and the Kabaka with his Prime Minister, Chief Justice, Treasurer, and his Lukiko or Council, rules it under British supervision.

In the other provinces there are paramount chiefs who enjoy almost the prestige of kingship and have their Lukikos too. But they act only in an advisory capacity to the British administration though they



Photograph by A. T. Schofield

LUTEMBE, POPULAR MOVIE STAR, BEGS FOR A TIDBIT IN EXCHANGE FOR A "SMILE"

The strange friendliness of this crocodile, living on the shores of Lake Victoria between Entebbe and Kampala, has brought prosperity to the villagers. Visitors come from far and near for the privilege of feeding two shillings' worth of fish to the 'croc'. Motion picture men have expended as much film footage on her as on many cinema stars. Lutembe returns to the same haunt each year after mating and is considered a village deity because she once punished a woman robber by snatching off her arm (page 111).

have their own native courts under the British courts.

Near the Kabaka's palace is the Lukiko Hall. Here, in October, the big chiefs from all over Buganda come to discuss laws and finance.

CHIEFS MEET AMID EERIE TUMULT OF HORN AND DRUM

I was present at a recent opening and saw the Kabaka on his throne, his feet on the royal leopard skin.

The chiefs, some of them aged and gray-haired, wore their ceremonial robes, and the Kabaka's musicians heralded every move in the proceedings with wild outbursts of drumming and weird strains played on horns.

The tomb of old Mutesa, a beautifully reeded hut in a big bare compound surrounded by the huts of his wives and female descendants, stands a mile or two away on a knoll.

The "widows" guard it night and day, and sometimes, when you enter the dim interior, you will be startled by an eldritch shriek and a fierce pounding upon one of the royal drums. These, of taut oxhide, are housed in a separate hut.

On another hill is the Mengo Medical Mission, founded by the medical missionaries. Here also is a maternity training school, where native women are trained in midwifery, and where much has been done to decrease the appalling mortality among native infants.



Photograph by E. Gladwin

LIKE ESKIMO KAYAKS UGANDA CANOES ARE SEWN TOGETHER

A long tree trunk is hollowed by burning or hewing to make the keel. Side planks are fastened by sewing them with thongs usually of palm but sometimes of animal tendon. The hull is covered with grease to fill the chinks and finally plastered with a coat of red clay. Natives propel their craft with heart shaped paddles. Sails are never set.



Photograph by Sir Bernard Bourdillon

THOUGH SMALL IN STATURE PYGMIES MAKE BRAVE HUNTERS

A normal sized soldier of the King's African Rifles towers like a giant above these tiny inhabitants of the Ituri Forest on the northwestern side of the Ruwenzori Range. They are examples of Uganda's contrasting peoples.



© A. T. Schofield

HIS HIGHNESS SIR DAUDI CHWA IS OF LORDLY STATURE

Standing beside the Kabaka is his brother, Prince Suna, an officer in the King's African Rifles. Although Buganda is under British supervision, the ruler enjoys the rights of Kingship. They stand in the doorway of Lukiko (Council) Hall, in Kampala, where the chiefs gather every October to discuss laws and finance (page 116).

Near the mission is the large Anglican Cathedral of Namirembe, and on a hill opposite stands the mission and cathedral of Rubaga, built by the White Fathers and their lay brethren and converts. One chief gave three forests to provide timber for its beautifully carved woodwork.

On other hills are the European residential quarter, the college which seems destined to become a native university, the hospital which was first started as the headquarters of a campaign against venereal diseases which were ravaging the

tribes, the reservoir, the Indian schools, and the Mill Hill Mission.

On the outskirts of Kampala, a fine 18-hole golf course occupies the valley of the Kitante River, once a noisome swamp thickly clothed in elephant grass, reeds, and wild date palms; and all around the town are the huts and the banana, sweet potato, cotton, and muhogo patches of the Baganda.

At sunset, when the shrilling of cicadas and grasshoppers, the hammering of fruit bats, the clamor of frogs, and the basso profundo of bullfrogs began to tune up for their nightly orchestral performance, the smoke of native fires curled thinly about the hillsides and mingled with the mist that was spilled in milky

pools in the valleys. The sounds of native voices, softened by distance, drifted on the evening air.

The nights, in spite of that persistent undercurrent of noise—the voices of all the night creatures—are very peaceful in Kampala.

By day, Kampala, with its stores and garages and its two hotels, is busy and noisy enough; and in January, when the cotton-buying season opens, its streets are crowded with lorries, cars, and native buses, and its bazaar hums with trade.

A journey through forest and banana groves, past innumerable cotton patches and wide cane fields, took us across the Nile bridge to Jinja, now the commercial and administrative center for Eastern Province, which grows more cotton than any other. The town is built on the edge of a peaceful bay.

HIPPOS GRAZE ON A GOLF COURSE

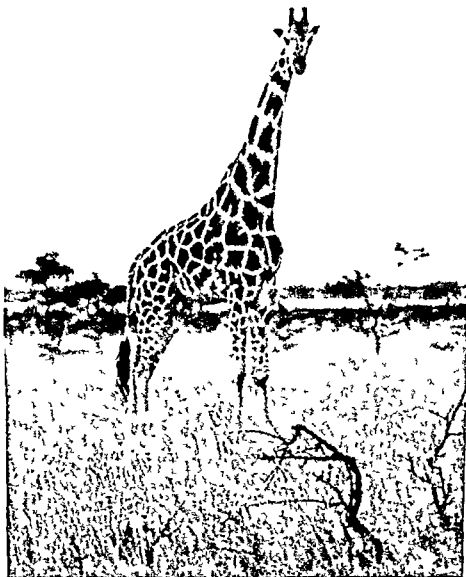
Here the lake empties itself over Ripon Falls and becomes the Victoria Nile.* Here crocodiles lurk, and hippos disport themselves, coming out at night to explore the township and graze on the golf course and here, near the falls, the local angler finds good sport.

The country of the Basoga beyond Jinja is not very lovely. Sparse thorn

trees gradually displace the fine muvulis and yellow flowered nsambya and the distances are flat the land given over to endless corn and cotton patches.

Here and there, as at Tororo, strange, vast rocks tower in gloomy isolation. Mount Elgon rises in a series of forest-clothed ridges to its extinct crater and on its slopes the Bagishu are being taught to grow arabica coffee.

* See World's Great Waterfalls by Theodore W. Noyes NATIONAL GEOGRAPHIC MAGAZINE July, 1926



Photograph by Sir Bernard Bourdillon

THE SKYSCRAPER AMONG ANIMALS SELDOM TRAVELS ALONE

Giraffes browse in brushy plains usually in herds numbering from five to forty. With long tapering tongues they reach among the branches of acacia and other thorny trees to eat leaves at second story heights. Knobs between the ears are bones covered with skin and bristly hair. Though usually shy and inoffensive they can beat off a charging lion with their stout rear legs.

Farther north is the country of the Karamojong and the Turkana, wild nomadic hunters, tall and thin as are all Nilotics near naked, with clay adorned hair and spears in their hands. Once their country was the happy hunting ground of the ivory traders and raiders. Men went armed to the teeth there with large caravans, and carried their lives in their hands.

Now all that land as far as the Ethiopian border is patrolled by the King's African Rifles. There are blockhouses and signal stations, and patrols move about in



© A. T. Schafeld

DISCOVERY OF RIPON FALLS IN 1862 SOLVED AN AGT OLD MYSTERY—THAT SOURCE OF THE MIGHTY NILE

Imbedded in one of the huge rocks is a bronze tablet in memory of the laundress explorer J. H. Spoke who after a long journey inland from Zanzibar here answered the question "Where rises the Nile?" Lake Victor empties its waters at this spot, giving birth to the Victoria Nile. The water station on the tongue of land supplies the town of Jinja.



© A T Schofield

PRIMES THE NOTY EVOKED HER COY GLANCE

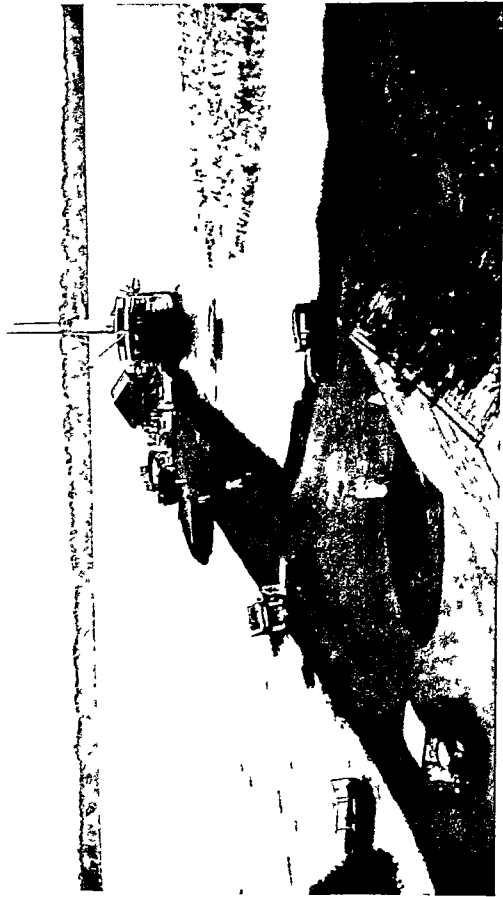
This Muhima girl of Ankole displays a wealth of shells fastened in her hair. When courting a Muhima man takes a pot of native drink a cow and a calf to the home of his sweetheart. If the father drinks the beer, and the girl partakes of a fresh bowl of milk the betrothal is announced.



© A T Schofield

A 6 FOOT 5 INCH CHIEF SMOKES A PIPE OF PEACE

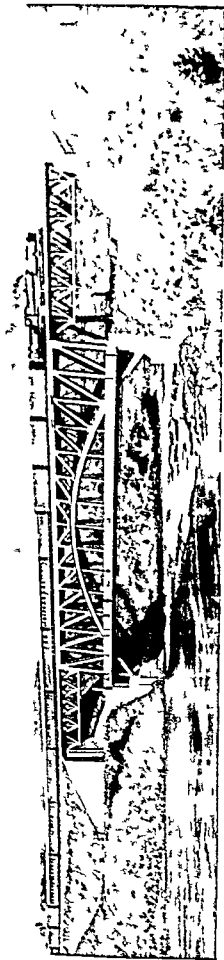
Watusi men sometimes attain seven feet and accentuate their stature by arranging their hair in two upstanding crests. Agile in athletics especially the high jump these natives have an aristocratic bearing and sets do much of their work. This dignitary's home is in the Kigeri District southwest Uganda.



Photography Wire's block

THE CEMENT HILL, A KNOCIDOWN STEAMER, DOCKED IN THE HARBOR OF ENTLEH, SLAT OF THE BRITISH CONFRONTMENT IN UGANDA

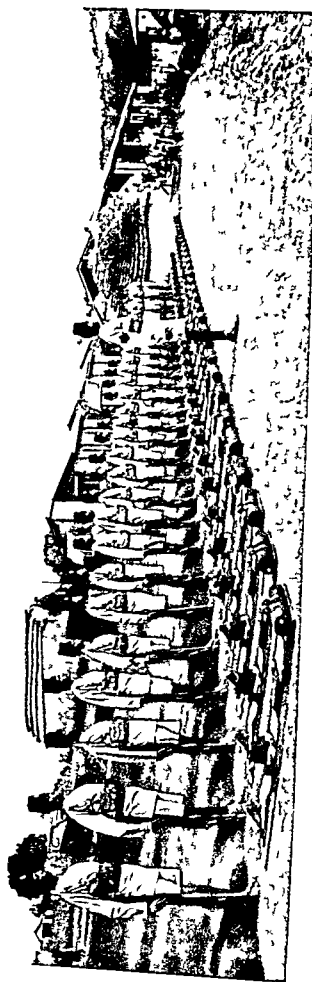
This vessel and others that fly Lake Victoria were built in England and then set up and hunched on the lake. Boats steering across Victoria often trail waters of misty, mile-thick clouds of kungu fumes for waterpouts or the smoke of a steamer hull to win. The insects form in such dense masses that when a ship passes through them the skipper allows his vessel to cut off the fly fog. In the garden city, is perched on a promontory overlooking the lake. Flowers and fruits (tree line) are and green lawns about it. Numerous human beings are visible in the foreground.



THE MAIL TRAIN OF THE KENYA AND UGANDA RAILWAY SPANS THE RIVER AT RAPON FALLS

A new steel bridge spans the river at Rapon Falls. Excellent ground for anglers and these waters. The railway now extends from Mombasa on the east coast of Africa to Kampala, the commercial city of Uganda, and to Fort Bell on Lake Victoria.

© A. T. H. F. D.



TEN TION AND THE KING'S AFRICAN RIFLES LINE UP SMARTLY FOR INSPECTION. Baganda are tall and luscious and have proved splendid troops. During the World War the Askaris as they are usually called acquitted themselves well.

© A. T. H. F. D.



C. A. T. Schofield

THROUGH A NARROW CLEFT THE NILE RUSHES TO MAKE THUNDERING MURCHISON FALLS

Between Lake Victoria, its source, and these falls near Lake Albert, the infant river flows through such canyonlike walls that but for here it is a wind-swept dry stream. The constant supply of water tapped from the great Lakes Victoria, Albert, and Edward forms a nucleus that keeps green the Nile's lower valley in the Sudan and Egypt. During the rainy season mountain tributaries empty torrents into the Nile, spreading a richness of silt over farm lands. As a new dam now impounds much of this flood water and holds it for irrigation.



© A T Schofield

CLOWNS MAKE UP AND WHITE ROBE PROVIDE THE UNIFORM FOR THE ROYAL
MILKMAID OF TORO

Women attend to the cattle possessed by the Mukama or king in the district north of Lake George. The milk is borne to the royal house in a plaited vessel used especially for the ceremony (page 127)

six wheel lorries. So His Majesty's peace is kept in what still is one of the wildest parts of Africa.

The Karimojong are fine dancers and on ceremonial occasions adorn themselves with paint and feathers and make a brave show. Their women wear innumerable neck, arm, and ankle rings of metal, and ornaments which pierce the lower lip.

But this wild country was closed to the visitor, so we returned to Kampala, our central point. The road between the two towns was full of traffic, and driving required some care. Buses filled with natives and loaded on the roof with a heterogeneous assortment of bicycles and bunches of plantain, scraggy native fowls and other produce, hurtled recklessly along.

Dozens of cyclists, often with girl friends on the carriers, wobbled in erratic fashion; pedestrians straggled from side to side; fowls scuttled squawking under our wheels; grazing goats and furtive native dogs leaped down from the grass banks.

Cattle with enormous horns massed in

the roadway while their herders flipped them ineffectually with sticks. Huts and villages dotted the green landscape.

The Baganda are a pleasant and courteous people, and quick to emulate the white man in clothing and ways of living. They train easily, whether as domestic servants, boy scouts, or seamstresses. Their women with their cropped pepper-corn hair, beautiful bare shoulders and long swathed garments, are not unattractive.

They walk well with their babies on their backs, often covering the infants with a gourd for shade. Neither they nor the men bear the tribal cuts and raised patterns on their faces and bodies which disfigure so many native peoples.

The men's garments vary from the white Arab *kanzu* like a long nightdress, to a strip of bark cloth, a sack with holes cut for head and arms, or European remnants that ill become them.

The Kabaka looks splendid in his royal robes and has a fine arrogant bearing (page 118). He speaks English perfectly,



© A. T. S. Hoffe

SALT WORKING AT KIBIRO IS A FEMININE MONOPOLY

Here women are the hereditary land holders and each plot is marked off with rows of stones. Salt from the brackish waters of Lake Albert encrusts the sand. Laborers heap the earth in piles and wash out the saline deposits with water from a stream. After the liquid evaporates workers wrap the salt in banana leaf bundles (page 129)

though his queen the Lady Irene knows no word of it

A COLORFUL RIDE TO LAKE ALBERT

Traveling northward from Kampala a run of five or six hours through papyrus swamps and forests and rolling hills led to the shores of Lake Albert.

In the Liana hung forest many of the trees are draped with white curtains of old man's beard, pinkish masses of wild bougainvillea clamber over others, starry white clusters of wild jasmine scent the air. The swamps are thick with tall purple orchids, tree heathers exhibit a mass of mauve spikes, the pink of wild peach blossom glimmers palely and the scarlet brushes of the kinkidi tree strike a bold note against the prevailing lush greenness.

The cotton was not yet ripe but there were little plots wherever there were huts. Guinea fowl scuttled off the road into the grass, doves fluttered out of the trees and coveys of francolins rose with a whirring of wings as the car passed.

Natives on the road, mostly pedestrians, often bore their loads on their heads. Many of them were walking into Buganda to find work.

We were in the Kingdom of Bunyoro now—a pleasant and fertile land where much tobacco is grown by the natives and where a number of European coffee planters have settled.

A steep escarpment overhangs Lake Albert and at its base are green flats where game roams and across the water the mountains of the Belgian Congo show blue and misty.

There is a strange village on the shore called Kibiro where the women are the hereditary landholders and own the primitive salt workings which are the wealth of the community (page 126)

MOONLIGHT—AND MURCHISON FALLS

At Butiraba the little port there was a flat bottomed steamer which at midnight started off northward for Murchison Falls. A full moon dramatically huge and brilliant silvered the calm surface of the water and eclipsed all but the bravest stars. The boat anchored at the mouth of the Victoria Nile to await the dawn.

The banks were fringed now with papyrus now with low, thick forest now with open glades of grass between clumps of low bush.

Antelopes of various kinds grazed here or posed like natural history museum groups on sun warmed slabs of rock. Crocodiles in incredible numbers basked open mouthed on sandy banks by the water's edge slithering in as the boat drew near them.

Hippos literally by the hundreds splashed and dived and yawned cavernously in the shallow bays their wet red brown hides and enormous horse herds glistering. Troops of monkeys played in the trees. Once our native helmsman steering by what the Goan captain admitted to be instinct gravely considering a compass which he could not read murmured "Tembo" and pointed to a herd of elephants moving in the bush on the right bank.

Just before noon a steady booming roar broke upon our ears. We rounded a bend and there at the end of a reach were Murchison Falls where old Nile hurls him self through a 19 foot fissure—a vision of dazzling spray and delicate foam that conceals an irresistible force (page 124).

The climb by a bush path to the top was a grueling one. We might have met elephants in our track as did a previous party and have been obliged to flee. Even lions have been encountered there.

A cross country road passing through wild and often uninhabited country brought us to the one running to the Ruwenzori Range* the romantically named Mountains of the Moon. The country changed as we neared them and we ran

through miles of luxuriant tropical forest, with huge trees and dense undergrowth.

The Mporora River crosses under a bridge and round about here these days elephants and hippos and even those most dangerous beasts buffaloes may appear on the road especially after dark. A few miles farther on is the little station of Fort Portal the administrative center for Western Province which includes the old kingdoms of Toro and Ankole. A number of coffee and tea planters live in Toro.

On a hill lives the Mukama and his court. Every February he is crowned anew an elaborate ceremony of donning a crown and a beard of colobus monkey hair (in which his chiefs imitate him) of passing through seven huts and of entertaining guests white and native (page 112).

Special ceremonies attend the milking of the cattle belonging to this king and these are seldom viewed by white men. The milkmaids wear clean robes and have whitened faces (page 125). The milk is borne in a special beautifully plaited vessel.

All too often the vast peaks of the Ruwenzori are swathed in cloud and mist. In the morning however every fold and ridge is clearly defined and on the topmost peaks is a glimmering line of snow.

A road runs southward along the foot hills and one side of it is a game reserve where the buck and the elephant and the giant forest hog are always seen. I sat in a Ford with the engine running while four elephants grazed not 80 yards away.

Mountain Bwamba women carrying loads slung across their brows by straps Bakonjo clad only in monkey skins passed. They came from the forests on the other side of the range and many of them carried loads of salt from Katwe on Lake Edward the salt lake at the southern end of the mountains. Seventy miles from Fort Portal we had to cross by a comic ferry a channel between Lakes George and Edward.

To me the loveliest part of Uganda is the District of Kigezi. Kabale is its chief town and here there are rushing rivers in deep valleys steep hills marked to their very tops with squares of cultivation—blue-green patches of peas and beans the darker green of bananas—and dotted with little groups of huts and granaries and cattle.

* See *And the Snow Peaks of the Equator* by A. F. R. Wollaston. NATIONAL GEOGRAPHIC MAGAZINE March 1909.



THEIR HUSBANDS BEAR ARMS FOR THE HOUSE OF WINDSOR

Native police, trained by the British, live with their families in these round huts at Kampala. Although Baganda men once had several wives, only one apiece now is permitted officially. Light dresses, draped on one side, are usually of vivid colors. Mothers carry their babies pickaback, and frequently protect them from the sun by large gourds (second from the left).



Photographs by Alice Schalek

PAY LOADS, NOT TIMETABLES, REGULATE UGANDA BUS DEPARTURES

Lucky the passenger who arrives at the last minute for he will not have to wait for vacant seats to fill. Several motor roads, radiating from Kampala, thread the hills and valleys of Uganda. A fleet of Government vans also operates on the same highways.



Photograph by Alice Schalek

A SALT EXPRESS STOPS ON THE ROAD NEAR FORT PORTAL

Bakonjo porters of Toro carry the product of their wives' "salt factories" in long banana-leaf rolls. Salt for the people of western Uganda is obtained from workings at the little village of Kibiro on Lake Albert (page 126). Burdens that weigh 130 pounds may not net more than 50 cents at market.

bomas. A magnificent road has been completed over the steep, bamboo-clad ridges into Ruanda, Belgian Congo, leading to that jewel of African lakes, Kivu.

ROAD REPLACES SAFARI TRAIL

Once, in the days before this road existed, I walked, with a long line of Bakiga porters balancing my kit on their woolly heads and jogging along at a curious bent-kneed lope, to the shores of Lake Bunyoni. There I embarked in a crazy dugout canoe for Bufundi, a camp on a peninsula that juts out from the western shore of the lake.

Visitors now motor there to bathe in waters crisply cold, green, clear as crystal; to see, and if lucky in avoiding the closed season, to shoot wild ducks, flotillas of which cross and recross the still water; to

watch sleek otters diving, and cormorants rising, showering spray; to paddle among vast stretches of pink and blue lotus lilies; to stalk the sitatunga antelope in the swamp of the upper reaches; to buy a sheep for three shillings, and chickens, vegetables, milk, even strawberries, for a few cents.

Thence, if they can face an arduous four-hour climb, they may march up and up the steep hills to the level of the bamboo forests.

Crossing a swamp of brownish reeds, "red-hot pokers," and muddy water holes, they see herds of forest elephants, small, with very long tusks of the so-called "rose-colored" ivory. They may meet the animals face to face on the narrow track, but a shout or a blast on a whistle will usually disperse the creatures.

Finally the climbers emerge above the forest on the plateau of Behungi a camp perched at some 8 000 feet

JEWEL LAKES IN A VOLCANO SETTING

The panorama from this camp looking down on the lava plain and across to the Virunga (Mufumbiro) volcanoes seems as if a vast green sea of ridged billows had solidified. Crater after crater has been upflung there and towering over all are eight vast volcanoes two of them active still with a perpetual pillar of cloud by day and fire by night.

Between the craters lie lovely lakes gleaming like metal. The volcanoes are stupendous and Muhavura a perfect cone is the legendary home of the local gods while when Niamlagira bursts into eruption it is a sign that their wrath is being wreaked upon men.

The people of the forests and the immensely fertile lava plain range from semi pygmies to seven foot giants and from red brown and light copper to almost black.

The tall ones are the lordly Watussi * of Hamitic stock who are a sort of feudal aristocracy with serfs—the Bahutu a squat and unprepossessing tribe—to till their soil and tend their fat cattle on the flowery plains which like English pasture land are thick with large clumps of thistle forget me not buttercups and ragwort.

The Watussi are attractive with long fine hands and feet and handsome profiles (page 121).

They are amusingly vain and the sight of a camera poised ready for action brings them hastening to stand about hopefully in their long togalike robes of scarlet patterned white with their slim ankles crossed. Leisurely by nature they have a charming courtesy. They seem born to be ladies of the field.

* See Land of Giants and Pygmies by Duke Adolphus Frederick of Mecklenburg NATIONAL GEOGRAPHIC MAGAZINE April 1912

Their women live in seclusion. I met one once walking on the road with two attendants. A metal fillet with hornlike decorations on her brows gave her a regal air but her walk was ungainly hampered by the masses of fiber rings that encased her legs from knees to ankles.

The semi pygmies or Batwa are reddish colored men with puckered faces and wide round eyes. They are skilled trackers and hunters intrepid in chasing elephants and the gorillas which live high up on the volcanoes Mikenso and Sabinyo.

They wield the fire stick cleverly, are all armed with a bow and arrows and move their villages from place to place as they hunt. They will sometimes dance and their dances take the form of mock battles.

The young Watussi braves dance too wonderfully leaping up high and coming down with ringing stamps. Their Sultan has a special band of dancers. They can also jump over a bar to heights sometimes exceeding the world's official high jump record.

To these people the mountains are gods which is not surprising for the massive bulk of the range dominates the country and the lives of those under its shadow.

A good road leads back through Kabale to Mbarara where the country reminds one with its plains and bare ridge after ridge of hills of a Zane Grey novel. Thence it goes to Masaka where charming Lake Nabugabo makes a week end picnic place for the town weary. And so to Kampala again and on to the airdrome where planes leave for London and home.

The Kenya and Uganda Railway will bring the visitor if he likes. But somehow it seems fitting that he should drop as it were clean from the skies into this little world that is so different from anything else and that he should leave it in the same way.

Out of Africa there is always something new. One finds that something in Uganda



TO SUNNY VACATIONLAND

—no hotel
bills
—no travel
fares



Prices from
\$510 up
f. o. b. factory

**CHEAPER THAN YOU
CAN LIVE AT HOME!**

See America, comfortably and thrillingly, in a new deluxe 1937 Pierce-Arrow Travelodge—the finest and safest of all tourist trailers. Tarry wherever you want to—as long as you want to—free from hotel bills, free from travel fares—for days, weeks, months of carefree, healthful adventuring.

If by chance the 1937 Travelodge is not yet on display in your vicinity, write to the factory for a booklet describing this luxurious home on wheels, with its all-steel framework, its temperature-proof aluminum paneling, its easy-riding independent wheel suspension, its special-equipment hydraulic brakes and shock absorbers.

TRAILER DIVISION
PIERCE-ARROW
MOTOR CORP.
BUFFALO, N. Y.

Commercial Units Also Available

**THE 1937 PIERCE-ARROW
TRAVELODGE**



TURN YOUR BACK ON WINTER



Now *Sunbather's*
SPORTS
OR
Sunbather's
**FAVORITE
SHORES**

You can mark cold, wintry days off your calendar the moment you arrive in Long Beach, largest and most picturesque of cities facing this famous shoreline. Here, the enchantment of a colorful port, the cosmopolitan gaiety of a care-free watering place and countless outdoor sports attractions await you. You'll enjoy this vacation more because living costs are so reasonable.



LONG BEACH

SOUTHERN CALIFORNIA

THE BECKONEERS Long Beach California U.S.A.
Please see if free booklet

Name _____

Address _____

City _____

State or _____

PLEASURE PORT OF THE PACIFIC

*Fastest...
most luxurious
route!*

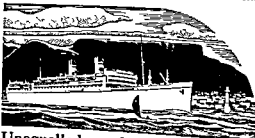
TO **SOUTH
AFRICA**



In as little as 19 days... you can reach Capetown from New York, and enjoy the shipboard pleasures of two "Lido liners" en route! First stage: the brilliant *Rex*



or *Conte di Savoia* to Gibraltar. Second stage: the glistening white, magnificent *Duilio* or *Giulio Cesare* to Dakar, Capetown, Port Elizabeth, East London, and Port Natal.



Unequalled speed... unequalled luxury... with Italian Line service, courtesy, seamanship all the way!



ITALIAN LINE

Apply to TRAVEL AGENT or 624 Fifth Ave.,
New York Offices in principal cities

REGOMMENDATIONS FOR MEMBERSHIP IN THE NATIONAL GEOGRAPHIC SOCIETY



January Begins a New Membership Year

Each member of the National Geographic Society has the privilege of recommending friends for membership. Nomination involves no financial obligation. Altruistic, non-profit-making, The Society depends upon your cooperation in expanding the membership for the progressive maintenance of its scientific and educational work, and for the continued improvement of THE NATIONAL GEOGRAPHIC MAGAZINE—which, through photographs and paintings, special map supplements, nature studies, and world visiting articles, makes humanized geography a living and a fascinating subject for young and old.



ADMINISTRATION BUILDING OF THE NATIONAL GEOGRAPHIC SOCIETY, WASHINGTON, D. C.

NOMINATIONS

DETACH HERE—OR YOU MAY NOMINATE BY LETTER IF YOU PREFER NOT TO CUT THIS PAGE

Secretary, National Geographic Society,
Sixteenth and M Streets, N. W., Washington, D. C.

1937

I nominate for membership in the National Geographic Society

DUES: Annual membership in U. S. \$3.00 Canada \$3.50 abroad, \$4.00 life membership \$100. Please make remittances payable to the National Geographic Society. Please remit by check, draft, postal or express order. The membership fee includes subscription to THE NATIONAL GEOGRAPHIC MAGAZINE.

(1) Name _____

Address _____

(Occupation) _____

(2) Name _____

Address _____

(Occupation) _____

(3) Name _____

Address _____

(Occupation) _____

Name and Address
of Nominating Member _____



Now! BIND YOUR GEOGRAPHICS

In the new, permanent, durable binder that equals in appearance the finest tooled leather bindings in your library, with the new simple mechanism at a surprisingly low cost—only \$3.65 per pair of covers. Each cover holds six issues of the Geographic. Write for particulars today to

The David J. Molloy Plant
2867 North Western Avenue Chicago, Ill.

CHAMPION-INTERNATIONAL COMPANY

MANUFACTURERS OF

National Geographic Paper

and other high-grade coated paper

LAWRENCE, MASS.

New 1937 Kunderd Gladious CATALOG

Free AMERICA'S MOST BEAUTIFUL GLADIOLUS BOOK

Describes hundreds of the newer Gladious, shows many large life-like illustrations in actual color. A delight and accuracy in every Gladious lower. Only clean healthy shop-free bulbs of the finest quality are offered. Many special collections. Write today for your FREE copy

AEKUNDERD INC., 151 Lincoln Way W., GOSHEN, IND.

EUROPE \$60

Via freighter. Large outside rooms; good meals. Mexico, \$30; Panama, \$25; Alaska, \$22; Japan, \$90; etc. Hundreds of low-priced trips to EVERYWHERE from \$2—\$3 a day. Cut travel costs. Get the ONLY COMPLETE booklet describing ALL freighter trips from U. S. and Canada. Send 25c coin or stamps (or \$1 for five copies) to

HAHAN PUBLICATIONS, Dept. L
270 Lafayette Street New York City

THIS MAGAZINE IS FROM OUR PRESSES

JUDD & DETWEILER, INC.

Master Printers

ECKINGTON PLACE AND FLORIDA AVENUE

WASHINGTON, D. C.



The one way to hear your favorite music whenever you wish

America is developing a new national characteristic... a love for fine music. You see it everywhere... in the crowds at concerts and opera... in the surge of new interest in Victor Higher Fidelity Records. Undoubtedly you have felt it yourself. You get twice the pleasure from music when you can hear just the music your mood calls for. The one way to have the music you want when you want it is to keep it at hand on Victor Higher Fidelity Records.

"The one way" is literally true... for only Victor Records cover the entire world of music... Today, Victor Higher Fidelity Records capture every sound of every instrument. They bring you performance that perfectly duplicates the original music from which the records were made.

Hear these new Victor releases

M317—Symphony No. 7 in A Major (Beethoven)

Played by Toscanini and New York Philharmonic Orchestra

4323—Indian Love Call

Jeannette MacDonald

Ah! Sweet Mystery of Life and Nelson Eddy

36190—Excerpts from Red, Hot and Blue (Cole Porter)

Victor Orchestra and Chorus

Listen to these records

on RCA Victor's Phonograph-Radios at your dealers

Time in on "The Magic Key" every Sunday, 2 to 3 P. M., E. S. T., on NBC Blue Network

VICTOR

RECORDS AND
PHONOGRAPH-RADIOS

A SERVICE OF THE RADIO CORPORATION OF AMERICA

* Mention the Geographic—It identifies you *

"Where shall we stay?"

NATIONAL GEOGRAPHIC MAGAZINE'S HOTEL SECTION

ARIZONA

Miami

IDAHO

Tucson

El Conquistador, Landscaped resort hotel with spacious bungalows in midst of desert grandeur. Unusually chaste. Glorious climate. All sports.

Pioneer Hotel, Southern Arizona's Finest. 250 Rooms with bath, P. rep. Coffee Shop, Dining Room, Roof Garden, Sun Deck, Sensible Rates. Booklet.

CALIFORNIA



Hotel Alcazar—On The Bay Front

One of Miami's largest and finest hotels. Steam heat. Two channel radio. Dining room, coffee shop, roof solarium. Moderate rates for fine accommodations. Also HOTEL HAYDON, same ownership. Not so luxurious as the Alcazar but most comfortable. Spacious. 1 bldg., porch, sun parlors. Convenient to everything. Conservative rates.

The Columbus, Miami's finest hotel. Seventeen floors of solid comfort. Facing Park and Bay. Every modern facility and service to enhance your visit.

Miami Beach

The Flamingo, famed for food service unsurpassed location and distinctive clientele. Beautifully landscaped grounds. C. A. Krom, Manager.



The Whitman By-The-Sea

'Aristocrat of Miami Beach'. Occupying full block between Ocean and Inland Creek. Private bathing beach. Marine terrace for dining, dancing and deck sports. Convenient to all attractions. Unrivalled cuisine and service. European Plan. Gentle clientele. Reservations in advance. Booklet on request to Fatio Dunham Manager.

St. Petersburg

Deerment Hotel, Overlooking Williams Park. Close to Tampa Bay and all points of interest. Steam heat, elevators. Amer. plan. Angus C. Craft, Mgr.

The Huntington, A resort hotel of merit in beautiful and exclusive surroundings. Close to all activities. American Plan. Booklet. Paul Barnes, Mgr.

Jungle Hotel, Country Club atmosphere. Golf at the door. Fishing. Tennis. Famed for food service and fair rates. John F. Hynes, Mgr.

Princess Martha Hotel, In the heart of St. Petersburg. Modern fireproof. 250 rooms each with bath. European plan. Lounge room. Booklet.

Savon Hotel, On Tampa Bay. Modern fireproof. 150 rooms each with bath. Finest service and cuisine. American plan. Every sport attraction. Booklet.

Viney Park Hotel, On Glorioso Tampa Bay. San bathing. Every recreational feature. Open until 11 p.m. Booklet. Clement Kennedy, Managing Director.

GEORGIA

Savannah

De Soto Hotel—The South's outstanding hotel. Rooms with bath. 21 up. Outdoor swimming pool. dancing nightly except Sunday. 13-piece orchestra.

Sea Island

The Clubster, The utmost in year-round sports. New York City, 50 Fifth Ave. (R. Enn. 4-3761). Chicago Office, 222 S. Michigan Ave. (Wabash 321).

Thomasville

Three Toms Inn, A charming winter resort hotel. Second golf, hunting, etc. Ideal climate. Booklet. Director of George C. Kewmon, Jr.

Ketchum

Sun Valley Lodge, See Union Pacific R. R. adv.

ILLINOIS

Chicago

LaSalle Hotel, Foremost in Friendliness. Near everything—LaSalle at Madison St. You'll be the clean, bright rooms—good food—reasonable rates.

LOUISIANA

New Orleans

St. Charles, the South's Most Modern Hotel. ac. commodating 1,000 guests. Spacious rooms. lofty ceilings. Center of New Orleans historical points.

MARYLAND

Baltimore

The Balvedere, Outside the business district, yet convenient to all the city's activities. Every modern comfort and luxury. Rates begin at \$1.00.

Lord Baltimore, Every modern facility for "70 rooms with radio, bath and shower. Famed Maryland cuisine. Faultless service. Rates from \$3.48 single.

MASSACHUSETTS

Boston

The Copley Plaza faces beautiful Copley Square. Single rooms \$1.00—double from 1.50. Suites from \$10.00. Arthur L. Rice, Managing Director.

MINNESOTA

Minneapolis

Curtis Hotel, Continuous to Minnesota's 10,000 Lakes region. Largest Hotel in the Northwest. Soft water baths throughout. Rates \$2 to \$6.

NEW HAMPSHIRE

White Mountains—Franconia

Packett's-on-Sugar Hill, Learn to Ski! Skiing School open for seventh season. European Treatment. Private practice slopes.

NEW JERSEY

Atlantic City

Hotel Dennis, Weekend rest-up by the sea. Sea decks and solarium overlooking boardwalk. Sea water and health baths. Both Plans. Walter J. Busby, Inc.

Princeton

The Princeton Inn, Facing golf course and Graduate College. Amer. plan. 100 rms. Fireproof. Hospitality as in days of old. J. Howard Slocum, Mgr.

NEW YORK

Albany

De Witt Clinton, A Knott Hotel. New will surprise. Fast Central Park. Splendid meals. attentive service. Come we'll make you happy.

New York City

Barclay Plaza, New skyscraper hotel overlooking Central Park at 4th Ave. Tower rooms from \$1 single. \$5 double. Continental breakfast included.

The Plaza, New York. Fifth Avenue. Facing Central Park. Single Rooms from \$6. Double from 10. Suites from \$12. Henry A. Hunt, President.

CONTINUED ON NEXT PAGE

Arrowhead Springs

Arrowhead Springs Hotel, 11 1/2 miles from the desert's edge. Famed for curative baths, sports, climate. 14 hours from Los Angeles. H. S. Ward, Mgr.

Beverly Hills

Beverly Hills Hotel and Bungalows, Mid the quiet and beauty of Beverly. twenty minutes from Los Angeles. Featuring a One Two and Three Meal Plan.

Hollywood

Hollywood Knickerbocker, All around a smart, elegant hotel. Deluxe apartments. Hotel rooms, suites, apartments. National tariff.

Los Angeles

The Ambassador, Twenty two acre Playground in heart of City. All Sports. Plunge Beach. Lido. Coconut Grove for Dancing. European. \$5.00 up.

Palm Springs

Desert Inn, Luxurious hotel and bungalow accommodations. All sports. Season, October 1 to June 1. American Plan. \$10 up. Write for folder.

El Mirador, America's finest desert resort. Sunny days of beautiful recreation and rest. Unexcelled cuisine. Discriminating clientele. Amer. Plan \$10 up.

Riverside

The Mission Inn, World's most unique hotel. Luxurious accommodations. Excellent cuisine, all sports. Amer. or Europ. Plan. Write for folder.

DISTRICT OF COLUMBIA

Washington

The Dodge Hotel on Capitol Hill. Men and women travelers enjoy the "No Tipping" service in all departments. Noted cuisine. \$1.50 single. 14-16 double.

May Adams House, Across from the White House at 15th and H. The best in accommodations and smart surroundings. European. \$3.00 up.

Hotel Marlborough—14th Street at M. Directly across from National Geographic Society. New and Modern. Every room with bath. European. From \$1.

Willard Hotel, adv. elsewhere in this issue.

FLORIDA

Hollywood Beach



Hollywood Beach Hotel

Hollywood Beach, Florida. A Resort City in itself offering a unique hotel club "Super American Plan". Ideal location in two-acre estate on the ocean. eighteen miles north of Miami Beach. Every facility for a complete vacation. (including published list of rates) write Oscar T. Johnson, General Manager.

Jacksonville

Seminole Hotel—Jacksonville's leading hotel. Every room with bath. \$1.00 up. In the heart of everything.

"Where shall we stay?"

NATIONAL GEOGRAPHIC MAGAZINES HOTEL SECTION

NEW YORK

New York City



The Waldorf-Astoria

Famous scene of New York social and business activities . . . convenient to the City's important and interesting centers. Various restaurants with comprehensive range of menus including popular price meals. Park Avenue, 49th to 50th Street, New York

NORTH CAROLINA

Greensboro

Sedgefield Inn. Restful. Modern. Adjoins Famous Golf Course. Riding, Tennis, etc. Excellent Food. American Plan. Folder. Louis D. Miller, Mgr.

Southern Pines—Pinchurst

Pine Needles Inn. Only completely fireproof resort hotel in central Carolina. Is late Donald Ross 18 course. For rates apply Emmett E. Boone Mgr.

OREGON

Portland

Multnomah. A nationally famous hotel 600 rooms. From \$2.50. Three to four blocks leading stores and banks. Three cafes. Famous food.

PENNSYLVANIA

Pocono Mountains—Buck Hill Falls

The Inn. "Snow Sports Capital of the Poconos" 2 hrs. from N. Y. Winter rates selected clientele. N. Y. Office, 600 Fifth Ave., L.A. 4-4212.

SOUTH CAROLINA

Aiken

Willcox's. Quiet restfulness. A club-like atmosphere. Heavily good food. Crisp climate conducive to outdoor activity. All mid-south sports available.

TENNESSEE

The Great Smokies—Gatlinburg

Mountain View Hotel. Headquarters for your visit to The Great Smokies, described in Aug. 1936 Geographic Modern. Always open. A. J. Hunt, Prop. Knoxville

Andrew Johnson. Your headquarters when visiting the Great Smokies Park and Norris Dam. Knoxville's newest and largest. 350 rooms with bath.

WEST VIRGINIA

White Sulphur Springs

The Greenbrier and Cottages. America's world famous spa and resort. Open all the year round. For rates and information apply L. R. Johnston.

BERMUDA

The Princess Hotel & Cottages. Largest hotel. Every recreational facility. Established clientele. Consult your local travel agent or write direct.

BAHAMAS

Nassau

Fort Montagu Beach. Nassau's Only Sea Beach Hotel. Thoroughly modern. Distinguished international clientele. All sports. Write for folder.

HOTEL SECTION
NATIONAL GEOGRAPHIC MAGAZINE
16th and M Sts., Washington, D. C.

Please have booklet and rate information sent to me at once by the following hotel(s)

NAME _____

ADDRESS _____

137

HUNTING WILD LIFE WITH CAMERA AND FLASHLIGHT

Now in its Second Printing—This Two-Volume Nature Book with 950 Unusual Photographs



This superb 950-page work by George Shiras, 3d—outstanding field naturalist who was first to take photographs of wild animals in their natural habitats, who originated flashlight photography of wild animals, and whose unique photographs have been awarded highest honors at home and abroad—is the living record of 65 years' visits to the woods and waters of North America. It is published by the National Geographic Society at cost because of its educational and reference value to conservationists, sportsmen, and Nature lovers of all ages. Each of the two volumes is 7 x 10 3/4 inches, durably bound in blue-cloth covers, embossed in gold.



"Doe and Twin Fawns"—one of Mr. Shiras's prize winning flashlight photographs which have made photographic history. It is a double-page frontpiece in Volume I.

***** \$5.00 PER SET *****

\$5.00 per set, postpaid in U. S. and Possessions; elsewhere, 50 cents additional per set. Descriptive folder on request.

National Geographic Society
Dept. MM, Washington, D. C. 1937

Enclosed please find \$_____ for which send me sets of George Shiras 3d's beautiful book, "Hunting Wild Life with Camera and Flashlight," in two volumes illustrated with 950 remarkable photographs.

Name _____

Address _____

NATIONAL GEOGRAPHIC SOCIETY, DEPT. MM, WASHINGTON, D. C.

A Happy New Year for

Kathryn

Dear Walter
You can toss away
the memorandum of that other
phone number now as we have
one of our own! And if you
don't think I feel swell about
it you're not the smart brother
I think you are. I got a
kick every time I pass that
telephone in the living room

Kathryn

* The number is Exchange 2376



THAT'S a real letter—written by a real Kathryn—to her brother. You can read her happiness in every line. She's mighty glad to have the telephone back.

And so are a great many other men and women these days. Almost 850,000 new telephones have been installed in the past year.

That means more than just having a telephone within reach. It means keeping the family circle unbroken—

contacts with people—gaiety, solace, friendship. It means greater comfort, security, quick and in an emergency.

Whether it be the grand house on the hill or the cottage in the valley there's more happiness for everybody when there's a telephone in the home.

The Bell System employs more men and women than any other business organization in the United States. The total is now close to 300,000. Good business for the telephone company is a sign of good business throughout the country.

BELL TELEPHONE SYSTEM



VOLUME LXXI

NUMBER TWO

THE NATIONAL GEOGRAPHIC MAGAZINE

FEBRUARY, 1937

TWENTY-FOUR PAGES OF ILLUSTRATIONS IN FULL COLOR

Changing Berlin

With 30 Illustrations

DOUGLAS CHANDLER

Life and Luster of Berlin

24 Natural Color Photographs

WILHELM TOBIEN
HANS HILDENBRAND

Observing an Eclipse in Russia

With 19 Illustrations

IRVINE C GARDNER

Natural Color Photograph of the Eclipse

Denizens of Our Atlantic Waters

With 10 Illustrations

ROY WALDO MINER

Strange Creatures of Sunny Seas

8 Paintings

ELSE BOSTELMANN

North About

With 24 Illustrations

ALAN J VILLIERS

We Escape from Madrid

With 15 Illustrations

GRETCHEN SCHWINN

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
WASHINGTON, D.C.

\$3.50 A YEAR

50c THE COPY

NATIONAL GEOGRAPHIC SOCIETY

GEOGRAPHIC ADMINISTRATION BUILDINGS

SIXTEENTH AND M STREETS NORTHWEST WASHINGTON D C

GILBERT GROSVENOR President

ROBERT V. FLEMING Treasurer

HERBERT A. POOLE Assistant Treasurer

FREDERICK V. COVILLE Chairman Committee on Research

JOHN OLIVER LA GORCE Vice President

GEORGE W. HUTCHISON Secretary

THOMAS W. McNEW Assistant Secretary

EXECUTIVE STAFF OF THE NATIONAL GEOGRAPHIC MAGAZINE

GILBERT GROSVENOR, Editor

JOHN OLIVER LA GORCE, Associate Editor

J. R. HILDEBRAND

Assistant Editor

MELVILLE BELL GROSVENOR

Assistant Editor

McFALL HERBEY

Chief of School Service

LEO A. BORAH

Editorial Staff

FREDERICK SIMPICH

Assistant Editor

ALBERT H. BUSTLEAD

Chief Cartographer

E. JOHN LONG

Editorial Staff

FRANKLIN L. FISHER

Chief Illustrations Division

WYMAN OWEN WILLIAMS

Chief of Foreign Editorial Staff

CHARLES MARTIN

Chief Photographic Laboratory

LEONARD C. ROY

Editorial Staff

BOARD OF TRUSTEES

ROBERT V. FLEMING

President and Chairman of the Board
Trusts National Bank

WALTER S. GIFFORD

President American Telephone and Telegraph Co.

DAVID FAIRCHILD

Special Agricultural Explorer U. S. Department of Agriculture

C. HART MERRIAM

Member National Academy of Sciences

LYMAN J. BRIGGS

Director National Bureau of Standards

GEORGE R. PUTNAM

Commissioner of Lighthouses Retired

THEODORE W. NOYES

Editor of The Evening Star

GEORGE W. HUTCHISON

Secretary National Geographic Society

CHARLES EVANS HUGHES

Chief Justice of the United States

WILLIAM V. PRATT

Rear Admiral U. S. Navy Retired

RAYMOND S. PATTON

Rear Admiral Director U. S. Coast and Geodetic Survey

ALEXANDER WETMORE

Assistant Secretary Smithsonian Institution

GILBERT GROSVENOR

Editor of National Geographic Magazine

J. HOWARD GORE

Professor of Mathematics The George Washington University

FREDERICK V. COVILLE

Botanist, U. S. Department of Agriculture

ELISHA HANSON

Lawyer and Naturalist

JOHN J. PERSHING

General of the Armies of the United States

GEORGE OTIS SMITH

Formerly Director U. S. Geological Survey

O. H. TITTMANN

Formerly Superintendent U. S. Coast and Geodetic Survey

JOHN OLIVER LA GORCE

Associate Editor of the National Geographic Magazine

CHARLES C. DAWES

Formerly Vice-President of the United States

GEORGE SHIRAS JR.

Formerly Member U. S. Congress Federal Naturalist and Wild Game Photographer

OSCAR WESTOVER

Major General Chief U. S. Army Air Corps

CHARLES F. KETTERING

President General Motors Research Corporation

ORGANIZED FOR THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE

To carry out the purposes for which it was founded forty-nine years ago the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material which The Magazine can use generous remuneration is made. Contributors should be accompanied by addressed return envelope and postage.

Immediately after the terrific eruption of the world's largest crater Mt. Katmai in Alaska a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—The Valley of Ten Thousand Smokes, a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

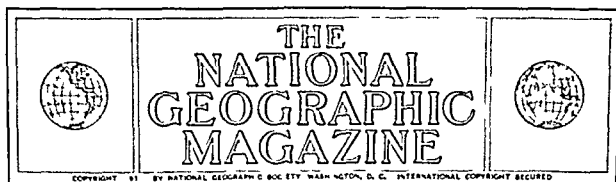
The Society cooperated with Dr. William Beebe in a deep-sea exploration of undersea life off Bermuda during which a world record depth of 3,028 feet was attained August 15, 1934, enabling observations of hitherto unknown submarine creatures.

The Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary who discovered the North Pole and contributed \$100,000 to Admiral Byrd's Antarctic Expedition.

The Society granted \$25,000 and in addition \$75,000 was given by individual members to the Government when the congressional appropriation for the purpose was insufficient and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

The Society's notable expeditions to New Mexico have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region The Society's researches have solved secrets that have puzzled historians for three hundred years. The Society is sponsoring an ornithological survey of Venezuela.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps the world's largest balloon Explorer II ascended to an officially recognized altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments and obtained results of extraordinary value.



CHANGING BERLIN

By DOUGLAS CHANDLER

LOOK quickly, down there to the left of our course. That little cupola topped button is the tower of the Wittenberg Castle Church.

Downward I peered from the window of the plane as directed by my elderly fellow traveler. There, pricking out from the clustering buildings like a tiny object seen through a microscope was the church on the door of which Luther tacked his theses on that fateful 31st of October 1517.

Wittenberg lies not more than twenty minutes before Berlin as one approaches the city from the south by airplane.

Presently thereafter, the flat partly wooded plain is broken up by a succession of waterways stretching out in a curved, continuing sequence. On a sandy level in the midst of this maze is sprawled the world's sixth largest city from the standpoint of area covered. Only Rome, London, Rio de Janeiro, Los Angeles, and Brisbane, Australia (in the order named), surpass it in extent. (Plate XIV) *

The air route is the ideal approach to Berlin. By no other means can the mind grasp the vastness of the city's spread.

Our plane, a two motored Douglas of the Swiss Air Lines—less than four hours out of Zurich with stops at Stuttgart and Halle Leipzig Airport—purred without perceptible vibration through the crystal air of an early September morning.

The pleasant drone of the motors now dropped to a lower pitch. After traversing successive areas of suburban homes

laid out in luxurious squares of green foliage, a section of red brick factories with tall chimneys jutting menacingly from the earth and finally a crazy-quilt jumble of business and residence blocks our pilot eased his shining gull to a gentle landing on the field of Tempelhof Airport. (Plate VIII)

AN AIRPORT BORN OF THE GOOSE STEP

Berlin is especially fortunate in having this spacious terminal for air traffic well within the city limits. It was Frederick the Great's passion for reviewing the goose step that did the trick. When, a hundred and fifty years later, aviation pioneers conquered gravity, thereby placing a premium on flat lands near cities, Frederick's parade ground was waiting ready made to serve as a landing field.

The silver haired lady whose chance acquaintance I had made in the plane with a red cross on its tail was met by her husband. Presentations concluded she insisted that I accompany them in their car to my hotel.

You'll find our city in a state of transition, she remarked as we sped on our way.

The pompous old architectural forms are vanishing. I'm a native Berliner, but I don't deplore the change. In fact I'm happy to see the New Age evolving a style of realistic beauty in keeping with today's practical needs.

I was astonished at this expression of tolerance for the upsetting of tradition. But it was only the first of many such surprises.

Come and dine with us when you can.

*In population Berlin ranks fourth among world cities being exceeded by New York, London and Tokyo.



Photograph from Wide World

MAY DAY MASSES JAM THE BERLIN LUSTGARTEN TO HEAR ADOLF HITLER SPEAK

Decorated with the swastika sign and guarded by troops the speaker's stand appears in the far background on the broad steps of the Old Museum. At the right appears a corner of the Berlin Cathedral (Color Plate I). The Maypole decorated with bunting and swastikas represents a revival of an old folk custom formerly observed chiefly in the rural districts.

find a breathing spell," said my hosts as we drew up before the address I had given. I accepted with warmth, and waved them good bye from the curb.

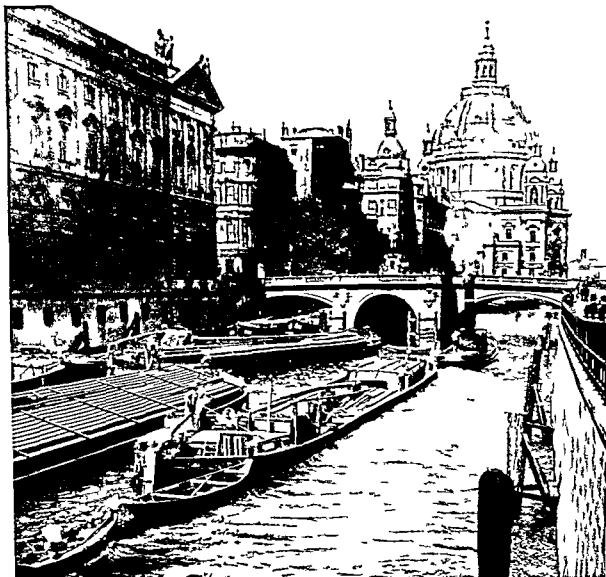
GENERALS, POETS, MUSICIANS IN BERLIN STREET NAMES

Ensnconced in the high ceilinged room of the hotel to which I had been recommended, I set myself to the task of a cursory orientation by means of a little green book, "Berlin from A to Z—An Official Directory."

As my eye roved through the alphabetical list of city streets I realized that here before me was the epitomized history of the Mark of Brandenburg.

Important victories on the battlefield and the generals who won them—names of former margraves, princes, and kings religious upheavals and the leaders who sponsored them—wizards of science, poets, painters, philosophers and musicians—outstanding personalities of the new Government—these and a multitude of other events and individuals are recorded among the names of the 9,500 streets within the city.

Luther Street and Luther Bridge—ah, here is our heroic reformer of the little town of Wittenberg! His pronunciamento brought, some two centuries later an influx of French Huguenots into Protestant



Photograph from T. R. Ybarra

OVER THE SPREE RISES THE VAST DOME OF BERLIN'S PROTESTANT CATHEDRAL

At the left is the Marstall formerly the royal stables but now a library and beyond the Kurfürstener Bridge is the former Kaiser's Palace. Being towed is a loaded barge with rowboats trailing on behind. Beyond still other cargo barges one with its burdens covered are crowded in the heavy traffic. The tug is about to lower its smokestack for the low bridge. Because it is spread over so much territory casual Berlin visitors may overlook this river's enormous water-borne traffic. But a glance at a big scale city map shows how conveniently the capital is served by canals and rivers which connect it with the sea and with inland cities (page 134).

Brandenburg. Therefore one finds a Französische Strasse or French Street with its French Church and likewise a French School in which to this very day French is the spoken language.

Let us pick a random few from this imposing list of names: Agricola and Apostel Paulus Streets, Alexander Square, Barbarossa, Beethoven, Bismarck, Blücher and Calvin Streets, a various assortment of Friedrichs, Galvani and Goethe Streets, Judenhof and Gutenberg Streets, Herkules Bridge, Helgoland Bank, Jerusalem Street,

Krupp, Robert Koch, Röntgen Streets, Seydlitz and Richard Wagner Streets, Tirpitz Bank, Waterloo Bridge, Washington Place.

Here is provocative material for the historically minded!

As a final fillip to my curiosity I discovered the name Unterwasser Strasse (Underwater Street).

Burying my Berlin von A bis Z in the bottom of my suitcase I sallied forth into the huge metropolis.

The baffling element of Berlin's character

is its extreme simplicity. One anticipates complexities which do not exist. The city is as unaffected and logical as the language spoken by its inhabitants.

Before one can begin to comprehend what makes Berlin tick, preconceived ideas of capitals must be cast aside. Gradually, out of the confused outlines of the vast mass, emerges a recognizable pattern.

CITY DWELLING COWS AND PIGS

Behold the anomaly of an urban agglomeration with a total population of some 4,220,000, a city which can boast one of the most highly perfected transportation systems in the world, with every convenience contributed by science—and yet which contains within its limits the following:

Twenty thousand cows (providing a third of the milk supply), 30,000 pigs, 10,000 goats, 700,000 chickens, 180,000 rabbits, 5,800 people keeping bees, only three or four buildings that I could find as much as ten stories high, twelve windmills still functioning, and more than 100,000 little gardens the harvests of which include such imposing yearly figures as 46,000 tons of potatoes and proportionate quantities of other vegetables and grains.

Such items would appear fantastic to the dweller on narrow, rock-ribbed Manhattan.

These little Schreber Gardens afford city workers easily accessible contact with the land which is so dear to the German heart; they promote bodily fitness through exercise, and minimize food cost.

Beside each garden is a neat little house for storing equipment. Here centers the odd hour and week-end life of a substantial number of families. During times of crisis, these wee shelters have even housed many who would otherwise have been homeless.

The so-called Schreber Garden movement, which has spread to most cities of Germany, was founded in 1864 by a philanthropist who named it in honor of Schreber, a famous physician of that day. The land is found in some cases by the city, in others by the State, and is furnished to its users (together with implements and seed) at a nominal price.

Where'er you walk, cool gales shall fan the glade.
Trees where you sit shall crowd into a shade.

Trees and rivers, more rivers and more trees. Therein lies Berlin's greatest hold on the hearts of its dwellers.

The two rivers, Havel and Spree (pro-

nounced 'Shprav'), with their eccentric twistings and turnings, form a network of waterways which makes it possible to reach many parts of the city by water.

These small streams and their tributaries, connected by canals with the Elbe and the Oder, give communication for transport of freight by steamer and barge to the farthest corners of the land (Plates XII, XIII, XV).

Berlin has, except for Duisburg, the largest shipping tonnage of any inland city of Germany. More than five million tons of goods arrived at the port in 1935 and 1,300,000 tons were dispatched.

Through the watery lanes, under gracefully arched bridges—of which Berlin has 1,006, even more than Venice itself!—glide long wooden barges heavily laden with coal, building materials, petroleum, and an infinite variety of other products (page 133).

Large numbers of fruit barges come in from the provinces, bringing apples, pears, and peaches in their holds. In some cases these loads are marketed directly from the barges, which find mooring at advantageous points within the town.

The banks of the rivers are planted densely with trees. Rows of lindens or plane trees line the majority of the streets. The public parks are standing armies of trees in close formation, through which cut beguiling avenues and paths.

The most numerous member of the tree family is the linden. Also in large numbers are found most of our familiar American trees such as maple, elm, horse chestnut (much beloved by the German), oak, acacia, poplar, and birch.

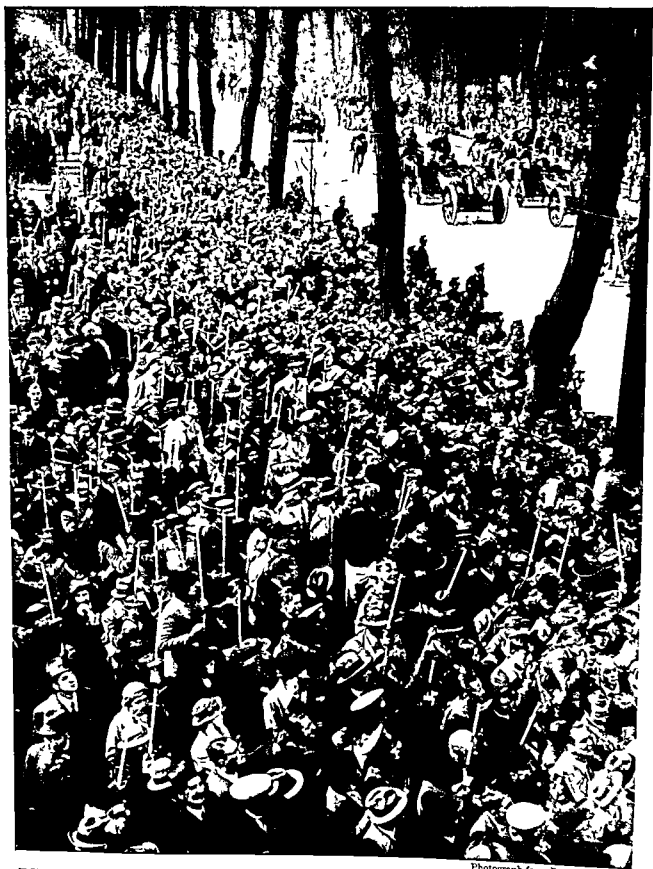
A census of trees standing in streets and squares alone—entirely exclusive of the parks—totals half a million.

The Berliner's love of trees is so deep that in many cases, where city appropriations have not provided the necessary funds, private citizens have paid for the planting of their own streets.

THESE CHANGING TIMES

As I walked through the streets of the Old City I found myself humming a line from a Princeton Triangle Club play way back in the dim ages of the Wiley Pure Food Act.

Renovate, rejuvenate, and incidentally change the date,' it ran. This jungle describes aptly the evolution taking place today in Berlin.



Photograph from Pictures Inc.

WITH PERISCOPES TIERGARTEN CROWDS WATCH HITLER'S BIRTHDAY PARADE—APRIL 20, 1936

Each drawn by six magnificent matched horses, heavy iron wheeled fieldpieces rumble over the paved streets. No other vehicle makes exactly the same sound as artillery when the caissons go rolling along. The Tiergarten, a wooded park area popular with pedestrians and horseback riders, stretches along either side of Charlottenburger Chaussee and is set with many monuments and sculptures.



© Douglas Chandler

THOUGH VANISHING BEFORE THE TAXI, A FEW BERLIN CABMEN STILL SURVIVE

Waiting for a fare this weather-beaten driver cheers his equine companion of many long winters with a lump of sugar (page 146). White cab horses are scarce because certain superstitious people will not ride behind one believing that to do so would bring bad luck.

Venerable, and in many cases unbeautiful, landmarks of a bygone day are being sacrificed to the demands of traffic.

Scaffolding clamber over the façades of many old buildings which do not have to suffer demolition but are going through a much-needed face-lifting operation. The Town Hall, a mammoth red brick structure, has recently emerged, rubicund and a bit garish, from an allover bath performed by steam and cleansing acids.

Where possible, worthwhile old buildings are being preserved. The march of time has not yet intruded on the neighborhood of the Nikolai Church, where one comes across such architectural oddities as the Knoblauch Haus—literally, "Garlic House"—with its vivacious rococo exterior, and its pretentious contemporary, the Ephraim House.

One learns from the archives of the Märkisches Museum that this latter was built by one Vettell Ephraim, an enterprising racketeer of Frederick the Great's time. He aided an embarrassed State and likewise amassed his own fortune by coining debased 'thaler,' nicknamed "Ephraimites," which

he struck from copper with only an onion-skin thickness of silver surface.

"MAIN STREET" SHORN OF ITS GLORY

The most striking change observed in the physical aspect of the city is that on Unter den Linden. This wide avenue, because of building the new subway, has been denuded of its famous shade trees. Their roots were too deeply sunk in tradition and earth to make their lot tenable when the human moles began their burrowing (Plate XIV).

These dignified patriarchs were carefully dug up and placed in other more hospitable locations. Their place has been taken by a quadruple row of fresh little upstarts. Shockingly callow and insufficient they look!

During the gay days of the Olympics these small lindens were overshadowed by rows of high poles from which in the mid-summer breezes waved miles of optimistic bunting (Plate III).

But now that glory is past, and they face the oncoming winter winds with ill-concealed embarrassment.



O Douglas Chandler

VISITORS, ON FIRST SEEING BERLIN, ARE AMAZED AT ITS ABUNDANT STATUARY

Here even the top of the main building of Berlin University former palace of Prince Henry of Prussia is lined with human effigies. This seat of learning which now enrolls about 7000 students is fairly new compared with some European universities not having opened its doors till 1810. Many Americans take courses here. At the left a teacher and her schoolgirls stand before a monument of Karl Wilhelm von Humboldt brother of the distinguished explorer and founder of the University (page 146)

It was Dorothea, wife of the Great Elector who caused the wide boulevard to be laid out, and who herself planted the first linden tree in 1681. Perhaps it would have been only fair for her generation to name the avenue for the Electress instead of for the tree she planted. However, they made amends by giving her name to the street which parallels Unter den Linden one block north.

HOGS BARRED FROM CITY STREETS

In 1690 an ordinance was passed by the Elector Frederick III forbidding the burghers of the neighborhood to allow their hogs to root around on the public street, as they were injuring the trees!

The winter of 1705 was one of extraordinary severity. Such was the cold that the 24 year old trees were destroyed and had to be replanted.

But the heyday of Berlin's Main Street was during the time of Frederick the Great. Then there were six rows of lindens instead of the meager four of modern times.

Berlin did not escape the westward pushing urge which has possessed continents, countries, and cities.

Oldsters of today tell of open fields and woodlands in western areas where now stretch illimitable acres of concrete streets and business blocks. The inexorable thrust of building enterprise has encircled lakes and linked once widely separated communities into an urban entity.

In the galloping twenties of the postwar period came the realization of the realtor's dream of a Berlin Broadway—Berlin in Light. The Kurfürsten Damm sowed its wild oats in the lurid early day of jazz but has now settled down to a smug bourgeois middle age (page 156).

The Emperor William Memorial Church (built as a monument to Kaiser William the First and his wife Kaiserin Augusta), which forms the root of the West Berlin section is as out of place amid its surrounding cafes, restaurants and movie palaces as Trinity Church is in the hubbub of lower Broadway.



© Douglas Chandler

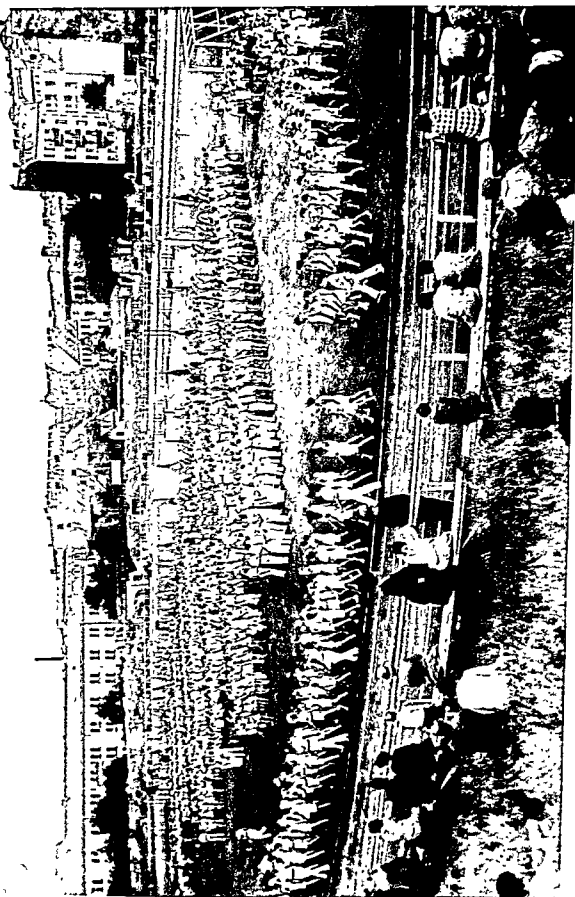
SUMMERTIME ESCAPE FROM CROWDED BERLIN SELLS THOUSANDS ENCAUMPED IN CROWDED QUARTERS ALONG NEAR BY HAVEL RIVIER
Colonies of three flimsy wick end huts and tents line river banks and lake shores about Berlin. Open air dining sun baths, and the care of tiny flower plots all add to the contentment of city vacationists (page 166)



© Douglas Chandler

IN OPEN AIR CAFES, BERLIN—ALONG WITH PARIS—LIKES TO SIT AND SIP AND TALK.

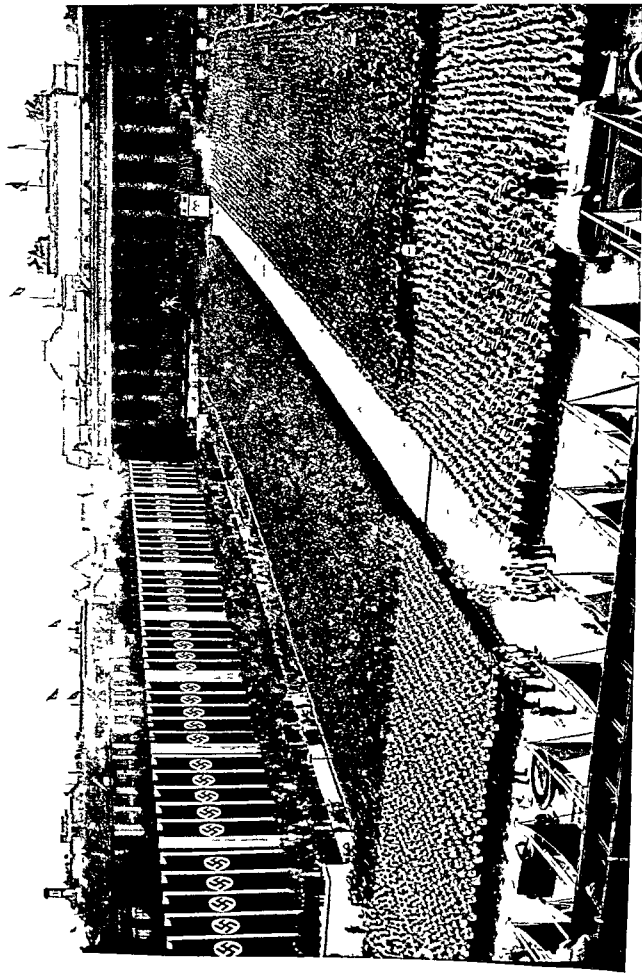
From the hole in the wall eating place to such fashionable restaurants as this the kroll in the Tiergarten at the edge of the River Spree there is almost invariably the added attraction of an outside garden. In some of the more informal out of door cafes families may even make their own coffee the restaurant providing water and cups. And as always in Germany there is the band!



TO DEVELOP BOYS AND GIRLS IN BODY AND MIND, AND THUS INSURE A STURDY RACE TO DEFEND GERMANY IN THE FUTURE, IS A POLICY OF THE PRESENT GOVERNMENT

Photograph from Keystone

On the athletic field of the Police Sport Society are seen some of the 5,000 young people who participated in the opening festival of the Gymnastic Corporation of Berlin.



OLYMPIC GAMLS OPEN AT BERLIN WITHIN THE "TORCHBEARER" RUNS UP WITH FIRE CARRIED FROM SOUTHERN GREECE
 Greek girls kindled the first flame by the heat of sun rays at the Temple of Zeus at Olympia. Relay runners, about 2,900 in all, bore the torch for some 1,800 miles through Athens, Sofia, Belgrade, Budapest, Vienna, Prague, and Dresden, and then to the Lustgarten (Pleasure Garden) in Berlin.



Photograph from W. de Woldt

'GOOD BY! BE GOOD AND SEND US A POSTCARD!'

Germany celebrates many legal holidays during the year and picnics and excursions are popular ways of spending the free days. Here is a typical farewell scene at one of Berlin's many railway stations.

Neon signs make a vivid imprint on the night aspect of the city. Step gaily up the Kurfürsten Damm or Friedrich Strasse at any time after dark and you will find your self wooed by the variegated pulsing effulgence of a host of dance halls, ball houses and cabarets.

BUMMELN IS THE GERMAN WORD FOR DOING THE TOWN

Haus Vaterland on the Potsdamer Platz twelve years after its much advertised construction, is popular with travelers. They flock in of evenings—visitors from abroad and from the provinces of Germany.

There are twelve halls each decorated to represent some special locality. One may choose between the Bavarian Alps, the Rhineland, the Wild West of the U. S. A., a glamorous bit of sunny Spain (machine guns omitted), and other exotic scenes.

Clever tricks of stage business lend verisimilitude. I chose the Bavarian room, and while I supped watched a thunder storm pass over the Zugspitze Germany's highest mountain. With an almost terrifying reality the storm tore across the back drop, thunder shaking the room, wind whis-

ting and moaning among the crags. Knives, forks and beer mugs lay untouched while it raged.

When the sun broke through the clouds a yodeler strolled among the tables juggling smooth balls of sound with his supple larynx. You can travel far for one Reichs mark at the Vaterland!

In an evening of Berlin *bummeln* one may explore the beer halls in the heart of the inner city.

Zum Nussbaum lays claim to being the oldest restaurant. The walls are adorned with caricatures by a popular black and white artist of the last generation depicting street types of his time. The murky smoke of yesteryear shrouds the few low volt bulbs of the narrow eating room. Wheezy laughter and cracked singing come from dismal corners.

Petty tradesmen with their families celebrate anniversaries by forgoing at Landre's Weissbierstuden which occupy their ancient site under the shoulder of the Police Headquarters. This white beer is a specialty of Berlin; it is not brewed elsewhere (except in Leipzig) because of some necessary element of the water.



Photograph by A. and E. Frankl

BRANDENBURG CANOE CLUBS LINE UP FOR A RACE ON TEGELER SEE

This popular summer retreat for Berliners, a tree-girt lake also draws sport lovers from near by Brandenburg, which is connected with the capital's suburbs by the Havel River. Beyond the canoes onlookers watch the race in sailboats and in double-faliboats, kayaklike craft of canvas now popular in Germany. (page 165)

Landres is proud of its old name and its bustling semi-respectability. The barman turns from loading a tray with a half-dozen white-capped beakers, puffs out his chest, and points to a sign above the bar. Established in 1684.

FOOTNOTES ON THE FOOTLIGHTS

Berlin's thirty theaters opened the winter season with a program of offerings which ran through a chronological gamut from Aeschylus to Knut Hamsun.

The State Theater in the Gendarmen Markt started its first night with a beautiful presentation of the *Oresteia* by Aeschylus. Among the winter selections are many plays of Schiller, Shakespeare, Ibsen, and such German favorites as Christian Dietrich Grabbe (whose centennial was celebrated last year), Hanns Johst, and Gerhart Hauptmann.

The Little House of the State Theater which is dedicated to plays of a lighter vein is producing morsels from the pens of Oscar Wilde, Per Schwenzen, and Zdenko von Kraf.

There seems to be little demand for innovations at the State Opera. Standard German and Italian works fill the bill.

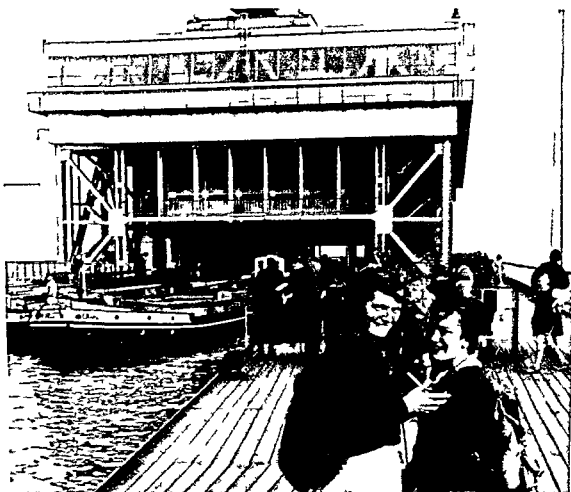
Wagner will receive the homage which is now accorded him by the orthodox.

It is not only Berlin's physical aspect which is undergoing change today; the language, particularly the written language, is also in a state of evolution. Many writers are abandoning the traditional long-winded style. The tendency is toward crisp, short sentences. American tempo.

MARK TWAIN'S APT COMMENT ON THE GERMAN LANGUAGE

Not quite so apt today would be Mark Twain's delicious comment on German speech in which he likens a German in the midst of a sentence to an underwater swimmer except that he ultimately does end, holding his verb in his mouth.

Youngsters and oldsters in every walk of life are attending English classes, not only in the large centers like Berlin, Hamburg, Munich, and Dresden, but also in the small provincial towns.



© Douglas Chandler

BY THIS MONSTER ELEVATOR, CANAL BOATS WEIGHING HUNDREDS OF TONS ARE
LIFTED BODILY, LOCK AND ALL

The water systems of Berlin and Stettin are connected by the Hohenzollern Canal through which flows an ever increasing stream of coal and heavy goods. East of Eberswalde the canal leaves a high plateau for lowlands along the Oder River. Till recently four locks built here raised and lowered boats a distance of 116 feet requiring two hours to lock a 350-ton ship. After many years of work this mammoth ship elevator was built and now a boat can be passed up or down in five minutes. The boat simply sails into a big trough of water which is lifted or lowered the vessel floating in it.

A recent ruling of the railroads makes it obligatory for all conductors to learn English. Gray bearded veterans coming in from a long weary run dash off to school.

On a trip which I often make from the Black Forest to Stuttgart the conductor regularly halts when he sees me and dragging a copybook from his uniform pocket gets me to hear him his lesson.

SAMPLES OF GERMAN SLANG

Where can I hear a sample of the colloquial language of Berlin streets? I asked my concierge.

Go you to the old flower women of the Leipziger Strasse (page 167), handle the

blooms with disapproval, and say that they are withered and expensive.

Brashly I proceeded to the experiment 'Your flowers are no good they are withered,' I said in German.

Shades of Dr. Johnson and the fishwife! What a flood of invective was turned loose upon me! When the old witch stopped for breath I timorously explained my jest bought an armful of roses and walked away crushed but enlightened.

The Berliner's sense of humor is something of a special idiom a bit on the dry side certainly not subtle. It has none of the bucolic coarseness of the Bavarian and is not so prankish as that of your rollicking



Photograph by Gunter Russ

TO SEE AND BE SEEN BERLINERS CROWD SIDEWALK CAFES IN FINE WEATHER

Popular as outdoor dining and drinking and concerts are with Germans many a visitor from warmer climes finds such social adventures a chilly experience. On Sundays dense crowds promenade the Kurfürsten Damm. Like the Boardwalk in Atlantic City at Eastertime this is a favorite promenade for displaying new spring outfits.

Saxon The Berliner makes fun of himself and his local institutions with good grace, but is likely to be taken aback if the outlander attempts facetious liberties.

As for typical slang of the Berlin streets, its name is legion. An expression of complete astonishment is 'Ich denke mir laust der Affe,' which must be literally translated as 'I think the monkey takes lice off me.' An 'Amerikaner' is a cookie with a heavy layer of icing. The expression for the first signs of baldness is 'Baustelle' a building lot. The Berliner's term for a cheap, showy dress is 'Fahne,' a flag.

There exist in the Berlin argot innumerable synonyms for money. It is called 'wire moss,' 'gravel,' 'powder,' 'pinkie-pinkie' (obviously onomatopoeitical), 'Marie,' 'coke,' 'coal,' 'thread,' 'shavings,' and scores of other names. The

Reichsmark is usually spoken of as "Eier" (eggs), or as "Emmchen," the diminutive form of M, the letter which stands for mark.

The boulevard wits have now dubbed Unter den Linden "Unter den Laternen" because the street lamps are bigger than the trees.

BERLIN'S TRAFFIC HEARTBEAT IS RAPID

The pace of the Berlin pedestrian is conspicuously unhurried.

Motor traffic, on the other hand is unusually rapid. The drivers of the 620 omnibuses hurl their two storied leviathans from stop to stop in lurching bursts of speed, the air brakes hiss with splenetic suddenness.

The comparatively small number of motor vehicles in Berlin helps explain the villagelike appearance of most streets. Counting private cars, trucks, and motor-

cycles registrations for 1936 show only a few more than forty thousand.

The traffic flow has a heartbeat of thirty seconds—half a minute of red light, an orange flash warning of change, followed by half a minute of green. To one accustomed to the longer intervals of most American cities, it seems at first a little hysterical in its frequency of interruption.

Upon arrival I was petrified to see autos passing stopped streetcars. The law, however, permits such passing, with the injunction that it be performed with extreme care.

The large number of bicycles on Berlin streets creates an additional hazard for the motorist, especially as the riders seem endowed with a sublime faith that the vagaries of their delicate vehicles will be unflinchingly observed by truck and car behind. Yet, with it all, casualty statistics are not high. The city's fatalities from traffic accidents totaled 358 for 1935.

The traffic lights halt squads of cyclists, girls in unbecoming but practical divided skirts, delivery boys carrying bundles bigger than themselves, tenders of street lights pedaling precariously from lamp to lamp with 8 foot ladders strapped to their shoulders.

There are still 51 horse drawn cabs in the city (page 136). The Germans call them *Pferde Droschken*, or horse droshkies. I talked with two of the old drivers who were hobnobbing beside their carriages in the Potsdamer Platz. With whimsical acrimony they bewailed the Motor Age.

'Why, sir, before the war there were between eight and ten thousand of us drivers on Berlin streets! Those were the days! There were three classes of Droschken: first class for the best people, second for the others, and third class, a combination of passenger and baggage carriers.'

Today we just pick up a bare living from the curiosity seekers. The ninety per cent are in a terrible hurry to go nowhere in particular.

FOUR MAIL DELIVERIES A DAY

The Berlin resident receives four deliveries of mail a day on weekdays and one on Sunday for good measure.

Five thousand postboxes announce their presence on street corners with a lustrous surface of red—that shade which someone has described as the color of audacity. Until within the last year they were a sober blue, but the color experts announced that they lacked visibility.

Special delivery obtains, but for those who desire extra rapid service there is the fast functioning pneumatic tube system reaching every section of the town. This is a convenience to the businessman and an undoubted blessing to exigent lovers.

I posted in midtown an important air mail letter (business strictly) one hour before the starting time of the Stuttgart plane. The letter reached Tempelhof Airport in proper time and was delivered to its destination in Stuttgart four hours later.

A SKYSCRAPER IS CALLED A "CLOUD SCRATCHER"

'How many skyscrapers have you in Berlin?' I asked the white-jacketed *Schupo* directing traffic at Belle Alliance-Platz (*Schupo* is the contraction of *Verkehrsschutzpolizei*, which means a policeman who protects traffic).

'None that you Americans would call by that name,' was his answer. 'But,' he added, 'we have three or four that seem pretty tall to us and a radio tower to boot.'

I paid my entrance fee and rode up to the roof garden of Europa Haus, the newest cloud scratcher, eleven stories high. There, surrounding an actual garden with blooming flower beds and gravel walks, were tables set in wind protected alcoves.

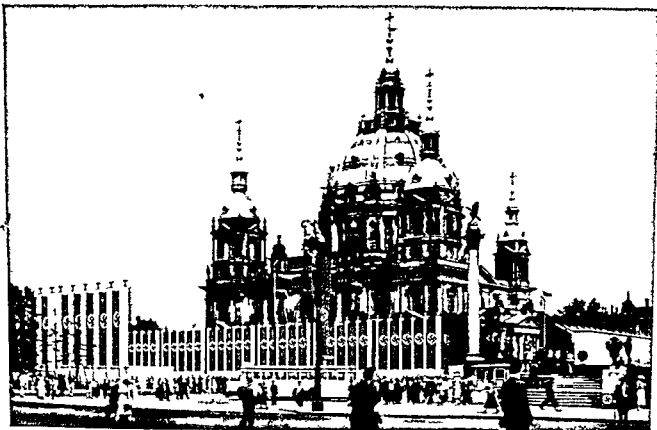
While I ate my luncheon I envied the sunbaths being enjoyed by earlier lunchers on steamer chairs strewn about the 'lawn' for the free use of roof guests. As there are no other high buildings or smokestacks adjacent, there was no soot to mar the picture.

Any list of the city's cloud scratchers should also include the new home of the Karstadt department store (page 159).

Columbus Haus on Potsdamer Platz and the handsome white building of the Shell Oil Company, which rises from the verdant bank of the Spree in mid city, are other contenders for dizzy honors, and neither exceeds ten stories.

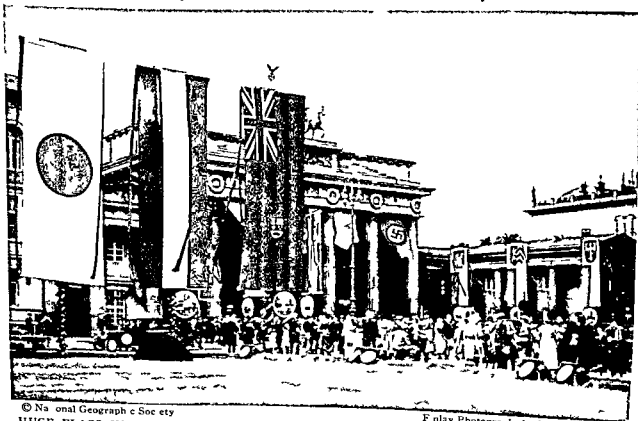
Berlin is not suffering from lack of educational institutions with its 13 universities, colleges and higher technical centers, 147 high schools and 203 grade schools.

Berlin (Frederick William) University, center of educational life, fronts on Unter den Linden across from the State Opera House. Such a dignified atmosphere of scholarship pervades the lovely gray building and its Linden shaded court that no one would suspect it was originally built as a palace for Prince Henry by his brother, Frederick the Great (page 137).



BERLIN CATHEDRAL LOOKS DOWN UPON STREETS BEDECKED FOR LAST SUMMER'S OLYMPIC GAMES

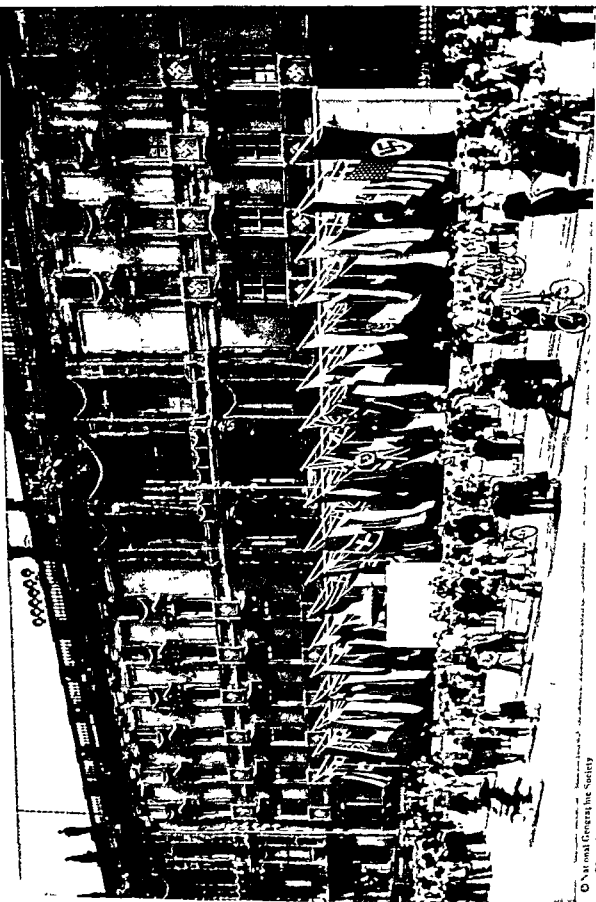
This Protestant edifice is really three separate churches under one vast roof. In its crypt are entombed nearly a hundred members of the Hohenzollern family.



© National Geographic Society

Finlay Photographs by Wilhelm Toben

HUGE FLAGS HUNG DURING THE OLYMPICS DWARF THE MAJESTIC BRANDENBURG GATE. Beyond the colors of Japan, the Netherlands, and Canada stands the massive Doric columned Brandenburg Tor, often called the symbol of Berlin (Plate IV). Napoleon in 1807 removed the Quadriga of Victory with its four copper horses to Paris, whence German troops recovered it in 1814.

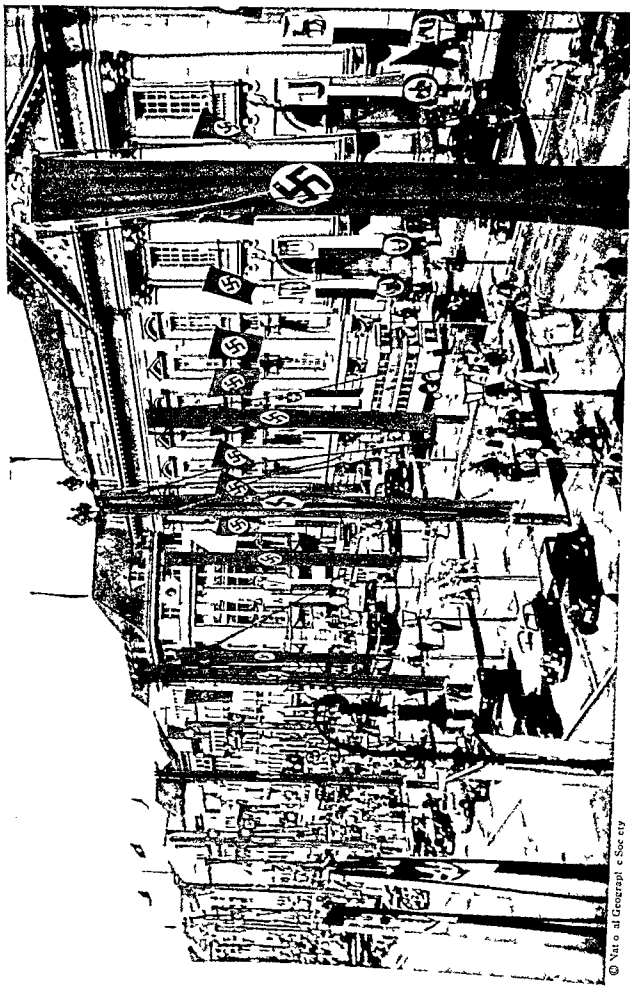


Finlay Photograph by Wilhelm Lobten

© National Geographic Society

CROWDS OF CURIOUS BERLINERS COME, ANHILATED AND AROUSED, TO SEE THE "OLYMPIC FIRE" AND FLAGS OF COMPETING NATIONS

In the vessel burns the symbolic flame brought to Berlin in 1936 from Greece, ancient home of the Olympic Games, by some 2,000 athletes, running in relays. Greece's colors are first (left). Germany's is last (right). The building is the Reichstag, or Palace, where Kaiser Wilhelm II gave the orders for war in 1914. Flags of many former combatants may be identified here (see "Flags of the World," National Geographic Magazine, December, 1934).

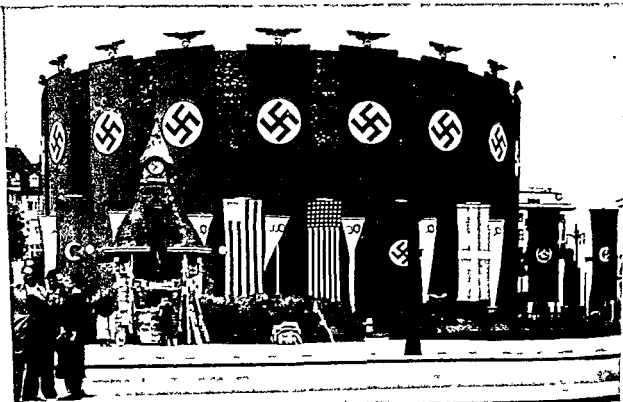


© National Geographic Society

BAN NERS OVER BERLIN—A BRIGHT SUNSHINY DAY WITH UNTER DEN LINDEN IN GALA DRESS

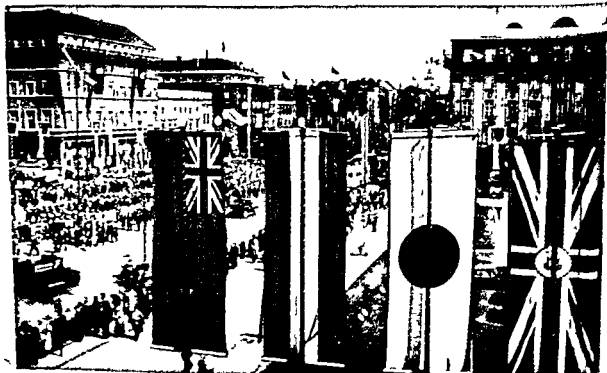
By far the most conspicuous is Germany's swastika emblazoned flag. The Zeughaus (Armory) at right begun in 1694 is now a military museum the Middle Ages to the World War. Here too is Napoleon's hat found near Waterloo!

Play Photograph by Wilhelm Toben



OMNIPRESENT SWASTIKA SIGNS ENCIRCLE HITLER PLATZ IN CHARLOTTENBURG

Foreign flags are displayed in honor of visiting Olympic contenders, flanking the Stars and Stripes the colors of Uruguay and Germany. This *platz* or square—with near by Broadcasting House, fair grounds, and athletic fields—is becoming a new bright light center in west Berlin.

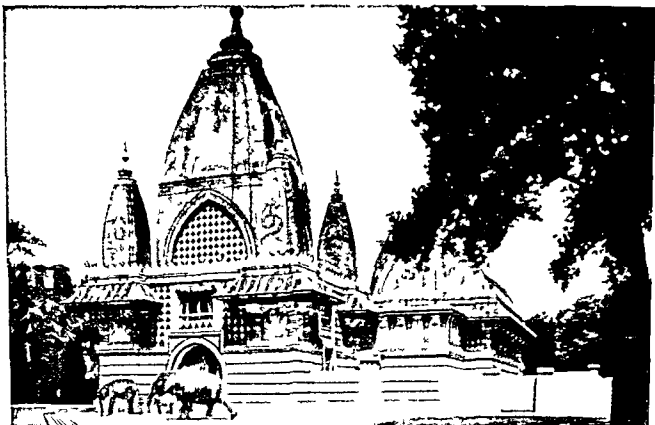


© National Geographic Society

Finlay photograph by Wilhelm Tolson

PERENNIAL STREET OF PARADES IS UNTEN DEN LINDEN SPAN HERE
FROM BRANDENBURGER TOR

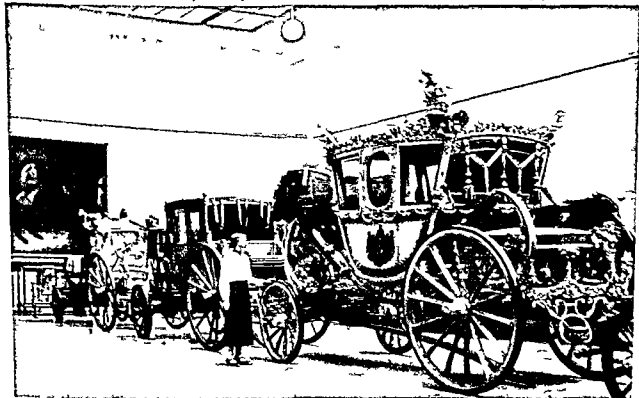
At the left approaches a marching column. At the right is the Hotel Adlon. Linden trees which
a formed this avenue were recently destroyed in subway tunneling and replaced by smaller ones (Plate III)



A facade of a temple by Hans H. Idenbrand

MODEL OF SOME TEMPLE IN INDIA THIS ORNATE TEMPLE SHELTERS ELEPHANTS

Pampered pachyderms in Berlin's Zoological Garden roam about without benefit of bars, but they are not quite as free as they look. Rows of spikes in the pavement at the left keep them from becoming too familiar. The Zoo is always well patronized, as the Germans are a Nature loving people.

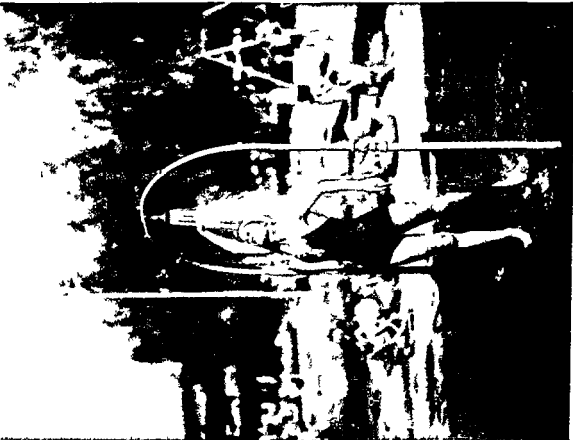


© National Geographic Society

Enslay Photograph by Wilhelm Toben

IN DAYS OF EMPIRE MANY A ROYAL PRINCESS RODE TO HER WEDDING
IN THIS LUXURIOUS COACH

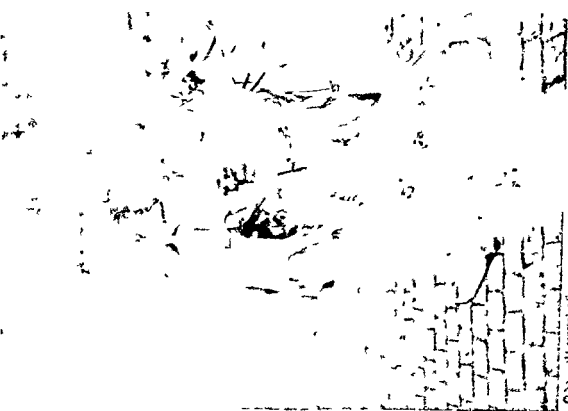
Built in Strasbourg in 1789 for King Frederick William II, the richly carved, gilded state carriage is preserved now in the Hohenzollern Museum. Führer Adolf Hitler makes official trips by motorcar.



Agfacolor plates by Hans H. Leibrant

THOSE WHO CANNOT GO TO THE BEACHES MAY
DO THEIR BATHING THERE

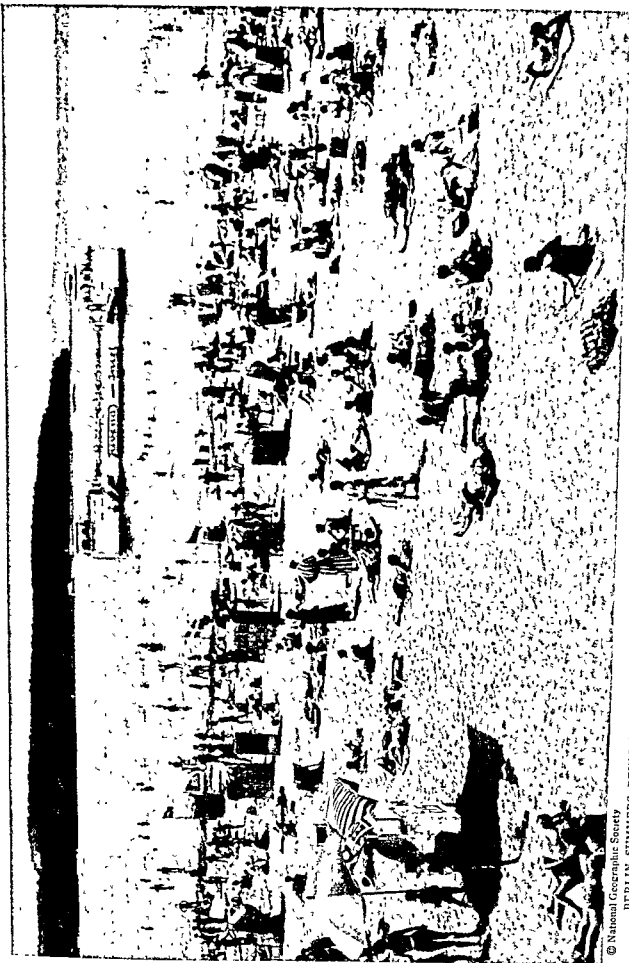
Berlin is so far north that it enjoys from 16 to 18 hours of summer daylight. Short as the season is, the city has numerous boat and bathing clubs, and it is famous for the excellent swimming



© All rights reserved by the Society

NOW LIVE IN YOUR OWN HOME TO COMFORT
AND CONVENIENCE

See the new lamp and early morning with bathhouse fragrance
streets and wetters here the fresh cut of the hotel church and
celebrations to the temple at the center

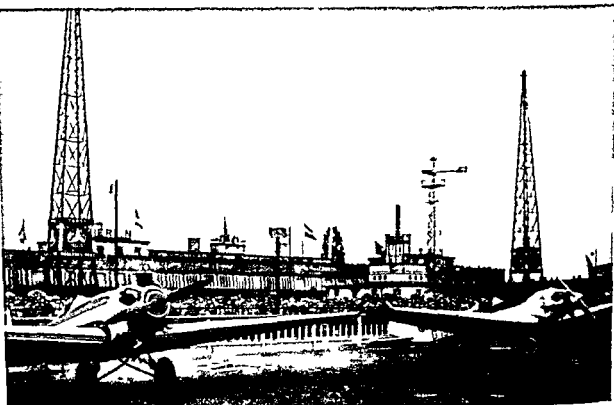


© National Geographic Society

BERLIN SUMMERS BEING SHORT, ANY BRIGHT DAY SEES BATHERS SWARM TO NEAR-BY RESORTS, AS HERE AT WANNSEE

Sailing southwest down the Havel River toward Potsdam, pleasure craft pass this wide expanse formed by the spreading river. Sun-bathing on warm sands and dining and dancing in shore resorts, Berliners make Wannsee their Coney Island.

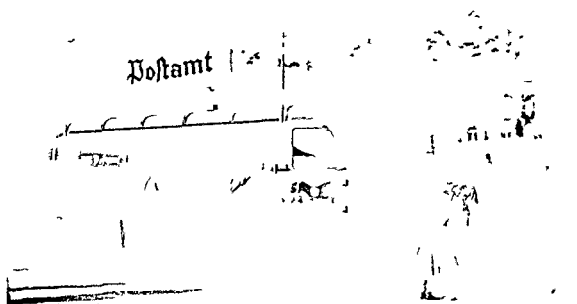
Agfacolor Plate by Hans Hildenbrand



Agfacolor Plate by Hans H. Idenbrand

AIR MINDED BERLIN CROWDS WATCH PLANES AT TEMPELHOF AIRPORT

This former military parade ground has become a modern, highly specialized airport city with hangars for scores of planes, a Zentral Flughafen, hotel, police station, post office, ticket office, and quarters for the airdrome staff. Wireless and weather instrument masts rise in the background.



© National Geographic Society

Flash photograph by Wilhelm Toben

ROLLING POST OFFICES WERE PROVIDED TO ACCOMMODATE HUGE CROWDS AT THE OLYMPIC GAMES

In the side of this truck is seen a characteristic general delivery window. Before it people line up to ask for mail, buy stamps, or drop picture cards to folks back home.

In the neighborhood of the University are several restaurants where one hears more English spoken than German. The guests are principally exchange professors from American colleges who come to Berlin for research or other scholastic purposes.

The Schwarzes Ferkel (Black Pig) is popular with the teaching fraternity and is the locale for all meetings of the Berlin Harvard Club. Tonndorf is another spot where the pedagogues exchange shop-talk over their veil cutlet and beer.

Modernism is not aggressively present today in painting and sculpture. The windows of the moderate price art shops are filled with decorative prints and printings designed largely to please the conventional taste. Scenes portraying fecund grainfields, mountain peaks piercing the upper ether, animal pictures, flower studies predominate.

Only a few doors from the American Consulate in Bellevue Strasse, street of the better art dealers there has recently been opened an exhibition of the latest styles in modern furniture. Designs compare favorably with similar showings I have seen within the last year in other European countries. Ingenious use is being made of materials hitherto unknown to furniture making.

BEER DRINKING HAS SHRUNK 40 PERCENT IN BERLIN

Has anyone ever regretted the demise of a statistician? Once wrote a disgruntled epigrammatist. Comprehensible point of view! But there are exceptions. I had the luck to meet one.

At the head office of the city's Bureau of Statistics I found the chief a person of considerable humor. Surrounded by diagrams and graphs he fed me with such factual morsels as the following:

Seven hundred and twenty thousand loaves of bread go each day to Berlin homes. 11,000 tons of coffee made from malt are drunk each year and only two thirds as much real coffee. Some 50,000,000 people annually visit Berlin's 400 movie-houses. Meat consumption is on the down grade, having dropped in one year from 157 to 127 pounds per person. Beer consumption has shrunk 40 percent in the last eight years, a fact of much significance as fore shadowing the physique of the future Berliner.

Apropos of beer it is interesting to discover that Munich, now the Nation's beer capital, originally was the center of a wine

country and learned the brewing art from northern Germany.

We can judge of the amount habitually drunk by the best people in the olden days by a cellar rule of the Electorate of Bavaria in 1648: 'Countesses and ladies of nobility are allowed four quarts for the day and three quarts for the night.'

Now however the youth of Germany striving for physical efficiency, scorn anything but the most moderate beer drinking. They predict that paunchy waistlines and bulging necks will be unknown to the next generation.

SPORT FIELDS AND LABOR CAMPS

A characteristic sight as one explores the various sections of Berlin is the sport fields with children or young people going through setting up exercises. With magnificent gusto they bend and twist, flexing muscles in unison with the rhythmic counting of physical instructors. There are 236 of these fields scattered about the city and in addition 660 indoor gymnasiums (page 162).

The bodily fitness of the present generation of youngsters is striking. I talked in a third class railroad carriage with a group of brown faced lads returning from their summer service in a labor camp. For six months they had been up near the border of the Netherlands digging ditches.

They described to me the routine of the camp life. Reveille at 5 a. m., a man size breakfast (which sounds more like a lunch) with soup, meat and potatoes and lib. Shovels flying until noon. Another meal followed by an hour's enforced siesta—

clothes off and in the bunks every man jacks up. No manual labor at all in the afternoons. Program of instruction followed by an hour or two of sport. Evenings of pastime in any preferred fashion.

Lots of us go in for woodcarving. I stated one of my fellow travelers and digging into his gear he proudly exhibited a carved picture frame with the coat of arms of Dresden, his native town.

Every German boy regardless of social position must between 17 and 25 years of age give six months of labor service to the State. There are 1,200 camps throughout Germany with 166 workers to a camp. The men live in light wooden barracks pinned together with bolts which can be transferred from place to place as each job is finished.

Irrigation of dry lands and swamp drainage are the exclusive tasks of these labor



© Douglas Chandler

'MUTINY ON THE BOUNTY' AS ANNOUNCED BY KURFÜRSTEN DAMM BILLBOARDS

Every night says the author Captain Bligh has his crew flogged here for the "shuddering entertainment of Berlin audiences. Spoken in English but with screen captions in German this South Sea drama has enjoyed much popularity among the capital's film fans

camps—no road making or other form of construction which could compete with paid labor

Service from the girls of Germany is not obligatory. However, it is the vogue to volunteer for such tasks as assisting workers in the fields or in the homes caring for children or substituting for an office or factory worker so that person can take a vacation without pay

PARIS MODELS AND THE AMERICAN SHOULDER

Verkauf Verkauf (Sale Sale)

Stores are bedecked with announcements of autumn sales. Windows teem with merchandise including conservative copies of Paris models to sell to women with small incomes

Most of the people on Berlin streets are

well dressed if that term can be interpreted to mean the wearing of good and comfortable clothes

Mens' furnishing stores exhibit weird arrays of caricatured dummies attenuated and globular clad in coats as square built as a New England woodshed. The sales man explains that this rectangular effect is the American shoulder

Beauty parlors flourish a bewildering assortment of jars set forth in their windows. A few of the better known American cosmetic lines are to be found. Red lips are no rarity

The long haired sisters have in this country always far outnumbered those with bobs. And with permanent waves within the range of all it follows that one sees hordes of Brunhildes crowned with rippling corn silk coifs



© Douglas Chandler

DAY'S WORK DONE CROWDS FLOCK HOMEWARD ON UNTER DEN LINDEN

Like upper Fifth Avenue this artery is a broad glittering thoroughfare of hotels clubs cafes and high priced shops. Here at Friedrich Strasse corner is found one of Berlin's busiest spots two dense traffic streams cross on the green lights.

A few years ago there was a slogan—The German woman does not smoke. That cannot at present be said though of a certainty she does not go at the business with the nervous enthusiasm of certain of her cousins across the water.

In different locations one encounters that red sign lettered in gold so familiar in American cities—F W Woolworth & Co. Prices take off at five pfennigs (about two cents) and climb to a dizzy altitude of one Reichsmark (about 40 cents). Every article except for beads and a few novelties from Czechoslovakia is made in Germany. The Woolworth chain in all Germany numbers more than 80 branches.

The problem of imports has been a grievous one for Germany during the years her borders have been hermetically sealed to outflow of gold. Barter has solved the diffi-

culty in the case of certain commodities. Bananas and pineapples from the Cameroons and coffee from Brazil—these and other exotic products are paid for with tractors tools and motor trucks.

On the same basis butter and eggs come from near by Denmark and there is a project under discussion for drawing on the Argentine's beef supply.

Much midnight oil has been burned in research laboratories during recent years in the hunt for new and inexpensive synthetic materials. Little short of miraculous seem some of the results demonstrated to me in Berlin. Synthetic rubber is now so cheap that the stores use rubber bands for small paper parcels because it is more economical than string.

The art of making the public conscious of unsuspected needs is not yet highly



Photograph from Wide World

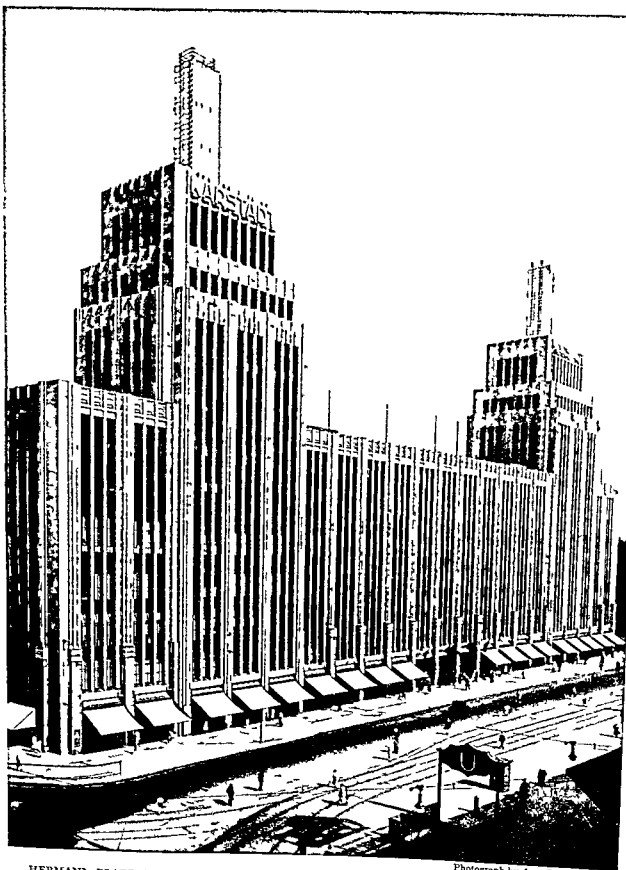
SOLOMON IN ALL HIS GLORY WAS NOT ARRAYED LIKE FORMER BERLIN POLICEMEN

This wax figure parade shows sartorial evolution of the law's majesty through many generations. Those at the right suggesting field marshals and admirals date from the 17th century.



BOY SCOUTS MAKE A LAST MARCH ALONG UNTER DEN LINDEN

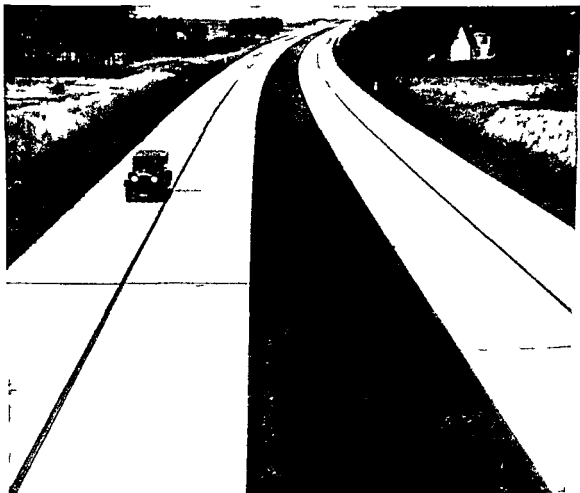
As a substitute for Scout training, German youngsters now join an institution known as the Hitler Youth organization. Its emblem is the swastika, and its wide activities and political training are enormously popular with all classes.



HERMANN PLATZ IN SOUTH BERLIN IS DOMINATED BY "WARENHAUS KARSTADT, AN ENORMOUS DEPARTMENT STORE

Photograph by Aug Rumbacher

From a roof garden on top of this modern structure an expansive view of all southeast Berlin may be enjoyed. In its methods of merchandising and display as well as in its architecture the emporium reflects American influence.



© Douglas Chandler

NEW ROADS LIKE TWIN RIBBONS OF CEMENT, SWEEP OVER GERMAN PLAINS AND ROLLING WOODED HILLS

Because of her position on the map military necessity long ago led Germany to build stone paved roads radiating in various directions from Berlin. They were sufficient for horse drawn artillery but rough for high speed motor vehicles. Today smooth cement roads remindful of America's best are beginning to be laid toward frontiers. Each strip here wide enough for four cars is a one way drive. Surface crossings are often avoided by the use of overpasses with four leaf clover approaches (page 170)

developed. Advertising is still in the nursery stage. Highways are not cursed with helpful hints for complicating existence. Beauty preparations and cigarettes occupy the lion's share of magazine space.

In trams, subways and elevated trains instead of the large car cards which challenge the American eye are narrow strips not more than three inches wide proclaiming in rhyme the virtues of certain wares. One brand of furniture and one of orthopedic shoes preempt the entire lateral space of all the cars.

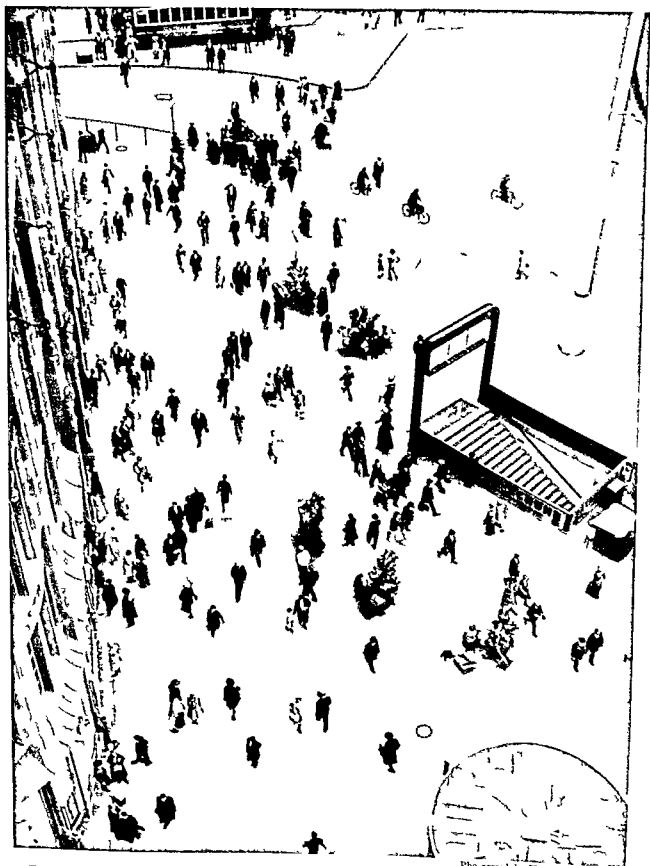
Verse also is much in vogue for the teaching of safety rules.

One poetic plea against the evils of coughing and sneezing which appears in every

public conveyance may be freely translated thus:

Hold it as your duty, brothers,
Not to give your germs to others.
Cough not in your neighbor's face.
Handkerchiefs the proper place!
If you feel impelled to sneeze
Do it likewise if you please.

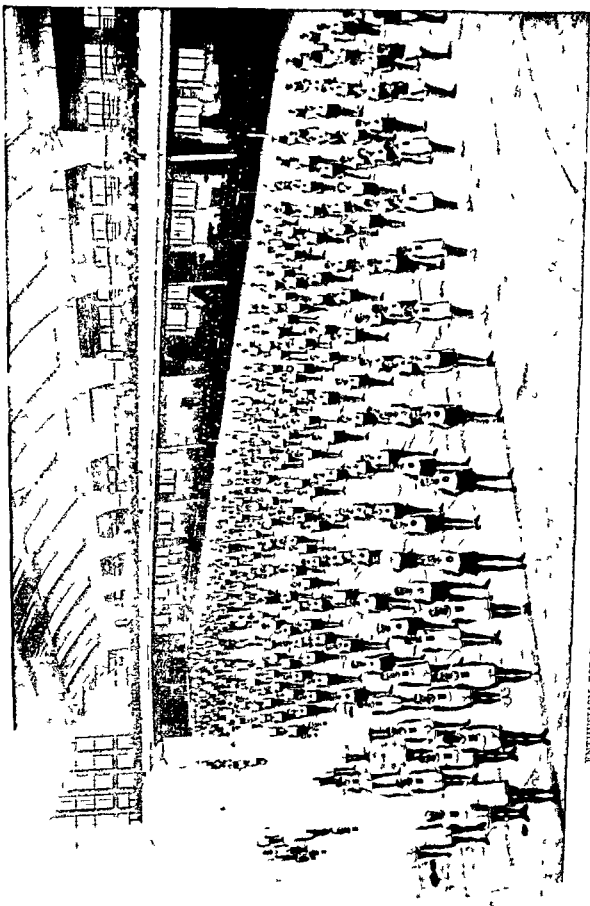
Humor is employed far and wide as an instrument of public education. Every railroad station has a bulletin board on which appear in lurid colors grotesquely exaggerated pictures of what will happen to you—TO YOU!—if you lean against the door, place your baggage insecurely in the rack, climb on moving vehicles or fall victim to a dozen other pitfalls of the road.



THE KONIG STRASSE FINDING AT ALEXANDER PLATZ FORMS THE CHIEF TRAFFIC CENTER OF EAST BERLIN

Photograph by Herbert Hoffman

Seen at the right is a subway entrance leading to a bewildering labyrinth of subterranean life. Two great architectural masses, the Alexander and the Berolina Haus, flank this busy square and shelter armies of office workers.



ENTHUSIASM FOR PHYSICAL CULTURE AND SPORTS OF ALL KINDS MARKS THE NEW GERMANY
 Here 1500 men and girls in the Exhibition Hall at the Kaiser Damm in Berlin a salute the word from their leader. The Fourth Winter Olympic Games last summer
 Partenkirchen in February 1936 and Berlin of course was the scene of the 11th Olympic Games last summer

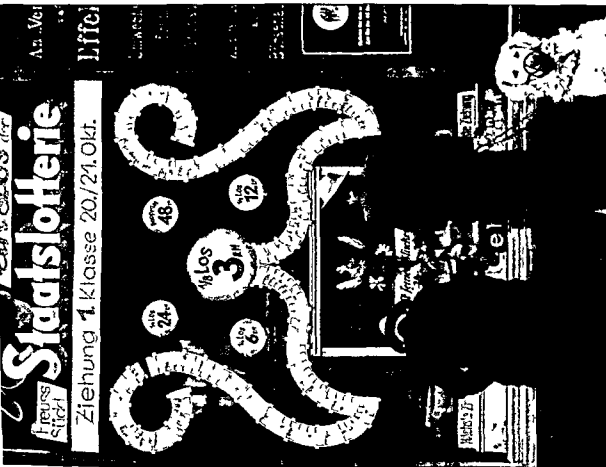
Photograph by Wide World



Photograph by H Inar Fabel

ROLAND ALMOST BRINGS HIS OWN BACK REACHING FOR A FISH IN THE BERLIN ZOO

Taught to do tricks to earn his food, this 4,500 pound sea elephant some 15 feet in length ate from 50 to 100 pounds of fish a day. He displayed much intelligence and became attached to his keeper.



© Douglas Chandler

AMONG LOTTERY TICKETS, AS AMONG RACE HORSES, THERE'S ALWAYS ONE THAT WINS

Luck symbols in Germany may range from horseshoes and four leaf clovers to the number seven and a certain kind of mushroom. This window, typical of many in Berlin displays lottery tickets for sale.



© Douglas Chandler

TO THE UNITED STATES SCHOLAR IN BERLIN, AMERIKA-INSTITUT OFFERS USEFUL STUDY FACILITIES

Established in 1910 and financed by Germans and Americans this institute exchanges scientific printed material between both countries. It contains not only the Roosevelt Library, donated by Theodore Roosevelt, but also a special American library of 16,000 volumes. Among members of its administrative board is a German teacher of American literature at Berlin University, who now is an exchange professor at the University of Nebraska making special studies of the American West. Explaining the library's facilities to a visitor is Director K. O. Bertling.

Another field in which advertising has definitely not been developed is that of personal publicity. The average individual seems actually to enjoy anonymity. The new papers carry only the sketchiest accounts of the doings of society, and except in reference to large diplomatic affairs, specific mention is seldom made of who attended what.

SETTLEMENTS REPLACE SLUMS

Determined to hunt up the worst of Berlin's tenement areas, I plotted out a two-day walk through the quarters where the other half lives. Nowhere did I find a spot which measured up to my conception of a slum.

Many unfit dwelling houses on narrow streets have been torn down. In their place stand settlements—groups of apartments offering decent, moderately priced quarters for workers' families. Nearly 3,000 have been constructed. Some have small gardens attached.

In addition to the city developed settlements are some huge ones sponsored by industrial enterprises. The outstanding example is that of the Siemens Company, that colossal producer of electrical machinery which was established in 1847. Its Berlin plants employ more than 120,000 workers.

Siemens Stadt has grown up around the works, forming an integral part of Berlin. There are model apartments, schools, hospitals, churches, playgrounds and theaters. I spent the larger part of a day going over the factories of this company, and came reeling forth from that apotheosis of mechanization feeling like Charlie Chaplin in *Modern Times*.

The Allgemeine Elektrizitäts-Gesellschaft, the General Electric Company of Germany, has likewise gone far in developing proper housing for its 47,000 Berlin employees.

The task of aiding the needy is being largely handled by the Winter Aid Cam-



Photograph by Burton Holmes from Galloway

**STREAMLINING, EVEN ON AN APARTMENT HOUSE REVEALS ULTRAMODERN DESIGNS
IN NEWER BERLIN ARCHITECTURE**

As in London, Hamburg and many other world cities, slum clearance and vast building programs have seen the bold rise of individual homes, flats, office and factory buildings differing widely from any previous ideas of human shelter.

paign. There are in the whole of Germany one and a quarter million voluntary workers contributing their services, which has kept administrative costs of the organization down to one percent of the total sum handled.

Principal among the methods of raising money are lotteries, the sale of badges and little handmade ornaments of negligible cost and the one dish meal once a month in private houses, restaurants and hotels. Through the latter means alone 365,000,000 marks were raised in 1935.

The idea is that one day in each month the midday meal shall consist of just one dish instead of the customary three courses. The difference saved is turned over to the Winter Aid. This abstinence is purely voluntary, though all are asked to participate in the minor sacrifice.

The beneficiaries of the charity are given commodities, not money. Sixteen percent of all coal burned for heating purposes is provided through the Winter Aid. In Berlin a general average of 800 pounds of coal is delivered each winter to households with

up to two children, for larger families sufficient is provided to keep two stoves burning. Enormous quantities of clothing, shoes, and food are distributed.

AN EXCURSION IS A FLYING-OUT

'Where on earth are all the people?' you find yourself asking as you walk through the deserted streets on a fine Sunday afternoon. Certainly at this same hour the Champs Elysees is thronged with a chattering strolling mob.

But this is not France! We are in Germany, a land of probably the most devoutly nature loving people of the Northern Hemisphere. The Berliner with his sisters and his cousins and his aunts—and grandfather and grandmother thrown in—has joined a daybreak exodus to woods and lakes.

Those who own some sort of boat go by the water route. By eight o'clock rivers and canals swarm with craft. *Faltboote** small

* See "Entering the Front Doors of Medieval Towns (by *Faltboat*)" by Cornelia Stratton Parker, NATIONAL GEOGRAPHIC MAGAZINE, March 1937.



Photograph from America

THOUGH NEVER GLORIFIED BY THE GREAT ZIGFELD SPREEWALD MAIDS THAT ARE AS BIG AND STARTLING AS ANY IN THE FOLLIES

For centuries the Wends a Slavic tribal fragment have lived in the Spreewald swamps near Berlin Besides their life on bicycles ice skates and in punts they are noted for their diet of cherry pe cucumbers and stewed eels*

folding canoes with double bladed paddles predominate In the motley van are also canoes of American pattern sailing boats of widely diversified rigs motorboats no bigger than bathtubs sputtering along by the thrust of outboard kickers sleek, rangy launches small yachts gliding with clever arrogance through crowded lanes (page 143)

At intervals the ranks open up for the passage of river steamers plying from Berlin's center to outlying resorts (Plate VII)

Lining the shores are series of tent cities aggregations of wood and canvas week end domiciles Huddled together at the water's edge stand the units of these flimsy colonies a welter of happy confusion (page 138)

From cookstoves comes a hunger teasing aroma of browning sausages coffee bubbles on the second burner Dishwashing a communal affair, engenders endless chaffing and laughter

Flaxen haired sun crisped youths wrestle with accordions the instruments panting

* See The Winds of the Spreewald by Frederick Sumpch in the NATIONAL GEOGRAPHIC MAGAZINE March 1923

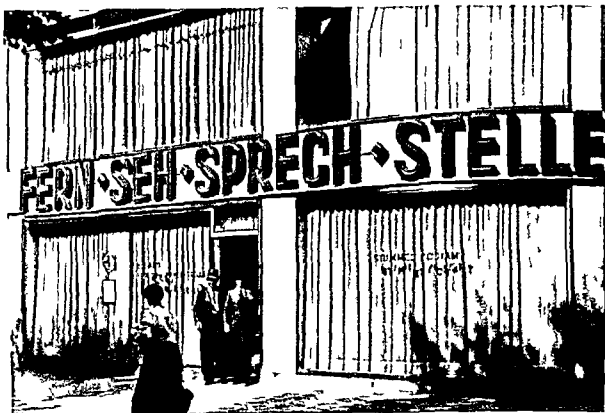
and wheezing in melodious exhaustion On grassy fields fat women in purple chemises rush numbly about, hurling blue rubber rings over the heads of their shouting relatives Brown arms thrash the water of the lake into diamond showers

A SHRINE OF PRUSSIAN HISTORY

Having explored the western environs of the city to the exclusion of the east I took the boat from Potsdamer Bridge on a sun flecked morning to the Kopenick district This Brandenburg landscape is one of wistful nostalgic beauty Langer See Muggel See—scene of the annual yachting races—and Teufels See (Devil's Lake) lure hosts of wanderers

On an island stands the Castle of Kopenick which has played an important role in Prussian history Here was the trial of the Crown Prince Frederick of Prussia afterward Frederick the Great court martyred by his own father

The baroque hall where the trial took place is still in excellent preservation I stood long in thought re enacting in my mind's eye the ordeal of the young man



© Douglas Chandler

LONG DISTANCE SEEING AND TALKING OFFICE READS THIS SIGN

In a branch post office near the Zoo the city has installed its first commercial television station. For about 60 cents you may call up a friend in Leipzig for a long distance see speak.



© Douglas Chandler

FLOWER VENDERS NOTED FOR RICH AND RACY ARGOT ARE PRIVILEGED CHARACTERS

Flippant back talk from these harp tongued quick witted women educated by years of contact with street crowds is accepted by Berliners with good natured tolerance (page 144)



© Douglas Chandler

MANY CITIZENS USE BERLIN'S POST OFFICES FOR WRITING THEIR LETTERS

This is one of Berlin's many branch post offices. The public writing room is well lighted with comfortable chairs, tables, inkpots and blotters. No doubt Teutonic thoroughness and pains taking also provide pens that will *write!* (Plate VIII)

whose spirit was subjected to such a cruel tempering process within these four walls

'MARYLAND' IN GERMANY

About two hours' ride east of Berlin, while cruising in a friend's automobile, I came across a strange phenomenon of nomenclature. Near Kustrin, in the Oderbruch, a region of fertile flat lands watered by the Oder River, I stared with incredulous astonishment upon encountering a group of villages which bear the names "Maryland," "Saratoga," "Hampshire," "Pennsylvania," and "Jamaica." Even more exotic were "Malta," "Sumatra," and "Ceylon."

The houses are of typical North German architecture, with little emphasis on the picturesque. But the roofs of these nondescript buildings harbor the descendants of a group of would-be pioneers who longed to gaze over far horizons.

The story of how the villages acquired their names was told me by a placid and very unromantic looking baker in "Maryland." Incidentally, he was a rover who had never ventured farther than Nurnberg!

It seems that in the days when Frederick

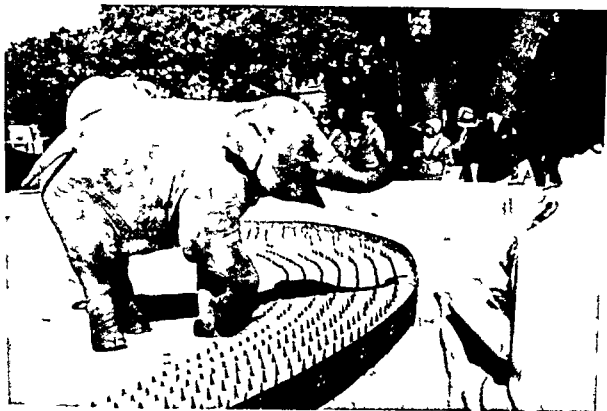
the Great was forming the villages of the Spree Havel district into the semblance of a city, there rose up a group of restless souls who wanted to transfer their destinies to America and other such outlandish spots.

Frederick, opposed to the colonizing idea, said a firm and peremptory "No!" He offered them instead lush lands lying along the banks of the near by Oder—and, as a sop to their thwarted wanderlust, suggested they name their new settlements after far-away places.

With commendable docility they settled down, sublimating their extravagant desires by building dikes to curb the wandering habits of Oder's banks.

Today their descendants accept the names as a matter of course. Through that alchemy of long continued familiarity, the names have ceased to possess for them any foreignness of sound. In addition, many of the pronunciations have been so Germanized as to be practically unrecognizable, as, for example, "I am eye ka" (Jamaica). But the spelling is unchanged.

In the course of my Berlin wanderings I did not forget the kind invitation of my acquaintance of the plane. An evening was



© Douglas Chandler

NOT EVEN AN ELEPHANT WANTS TO STEP ON A TACK!

Among great zoos in late years many clever devices have been evolved for the better exhibition of an animal and reptiles without the use of bars or screens. At Berlin seven rows of sharp spikes keep Jumbo in his place (Plate V)

arranged and I arrived in proper regalia at the gate of a handsome house in Dahlem a suburb built along lines rather suggestive of Guilford in Baltimore.

Although the comforts of a reasonable degree of wealth were taken for granted the household was one of tasteful simplicity.

Of the three grown daughters each had her profession. One was a goldsmith, another a practitioner of therapeutic massage, the third a bacteriologist.

Old World customs prevailed in this home. The gentlemen formally escorted the ladies to the dining room. Toasts were drunk with musical clinking of glasses.

The conversation was animated but more informative than witty. Like almost all Europeans of their intellectual level these people were profoundly interested in social and political problems. Although the house was situated within earshot of the championship tennis club, neither golf nor tennis was mentioned during the evening.

My husband reaches the age of retirement from business next year, stated my hostess as we sat over coffee.

No, he does not dread it because he has his *basteln* and his *musizieren*.

'*Basteln*' is a word for which we have no equivalent in English. It means in a general sense to practice one's special hobbies, but with the German it implies a more than amateur degree of skill in the doing.

The specialty of my host was the making of microscopes, telescopes and precision instruments in an elaborately equipped workshop in his attic. And when he sat at the concert size grand piano and played for us I found that his *musizieren* was also of a high order.

Noting the diverse accomplishments of this businessman I realized why retirement holds so little terror for many Germans.

There is a streak of sentimentality in the Berlin character that expresses itself in many ways which the sophisticated urbanite of other countries would probably sum up as quaint.

What for example could be queerer than that playfooted anachronism the dachshund? Yet this comic strip creature still holds leading place among canine pets in Berlin.*

Following in order of popularity seem

* See Field Dogs in Act on by Freeman Lloyd
NATIONAL GEOGRAPHIC MAGAZINE January 1937

to come the hairy chinned schnauzer and the boxer with his worried, conscientious black muzzle

Many department stores maintain a special room for the parking of shoppers pups. Each dog is assigned a bed and blanket. While Mistress seeks bargains Luxl or Lumpe waits chained to his post sniffing reproach.

PART YOUR CIGAR?

Another oddity of department store custom is the brass rack just inside the street door fitted with slots for holding the cigars of male customers. I have never succeeded in securing a satisfactory explanation of how the rightful owner can be assured of recovering his original stub.

Flowers fill a role of high spiritual importance in the lives of true Berliners. It is rare that one finds a residence without its blooming window boxes or other caches of burgeoning pigment. The flower vendors about the streets do a thriving business year in and year out (Plate VI).

I visited the wholesale flower market the old Lindenmarkt one morning at 7 o'clock. Rain was drizzling dismally and the day was not one to invite early quests of beauty. Yet at this hour the market was swarming with buyers both wholesale and retail. Florists wagons were being loaded with supplies for the day and housewives were haggling over the purchase of small bunches.

A law passed several years ago requires that electrocution be employed as the method for killing animals in the slaughterhouses throughout the entire country. Kosher killing is everywhere prohibited.

The system of house numbering is about to undergo a much needed change. Up to the present buildings have always been numbered *around* a street—up the right side and back down the left. Great is the resulting confusion. A compilation of the minutes lost thereby since Albrecht the Bear first crossed the Spree would surely reach astronomical figures.

One enjoys a sense of amphibian freedom when utilizing Berlin's urban transportation system. Tickets entitle the user to transfer from subway to surface from surface to elevated from L to bus or whatever combination may be chosen.

An anomaly of the public utility situation is dual ownership. Part of the system is owned by the city the rest is the property of the State. This results in keen competi-

tion between the different branches. The same dual ownership is found in the gas works and the electric works. There is at present a sales and advertising war going on about the respective merits of gas versus electrical refrigeration.

A surprising amount of road construction is now under way in or rather around Berlin. The fine highway when completed will entirely encircle the city on its outskirts and will serve as a valuable time saver for through traffic.

Amazingly ambitious is the program of highways now in progress throughout the length and breadth of Germany (page 160).

The roads are unusual in construction of a depth and solidity which should insure years of duration. Boulevards are built in double lanes. Each strip is a one-way road wide enough to accommodate four cars abreast. There are no crossings. All transverse traffic lanes pass over bridges and intersections are provided with the four leaf clover type of lead in.

When the now finished stretches are joined one will be able to drive from the North Sea to the Austrian frontier in about twelve hours with a fast car.

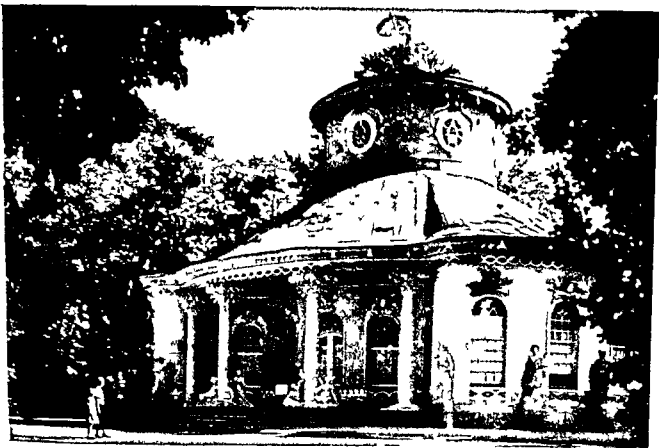
WINTER COMES TO BERLIN

At the close of my last day in Berlin I stand on the north end of a bridge facing the curve of the Spree. Around me a white cloud of gulls is tilting crying through the sad hush of a failing autumnal day. Back of the Reichstag which looms in the near distance the setting sun throws a red glow on the ornate dome and the gilded horsemen.

A bent old man stops at the bridge rail opens a paper bag and taking out small lumps of bread flings them one at a time out over the river. With childish delight he watches as the gulls swoop and pluck the morsels from the air.

Across the bridge returning from an outing marches a group of small boys wearing the uniform of the Hitler Youth—short black trousers brown shirt and black neckerchief slipped through a braided leather holder. They are singing in accurately pitched youthful treble that moving modern national song the Horst Wessel Lied.

A faint chill creeps over the dusky shimmering water. Winter is not far away. I shall hie me back to my Schwarzwald eyrie and my skis.



POTSDAM THE PRUSSIAN VERSAILLES WAS THE HOHENZOLLERN'S PLAYGROUND
 Oriental figures adorn this Sanssouci Park pavilion. Because some of the walls within are decorated with simian sketches Frederick the Great nicknamed the place "Monkey Hall."

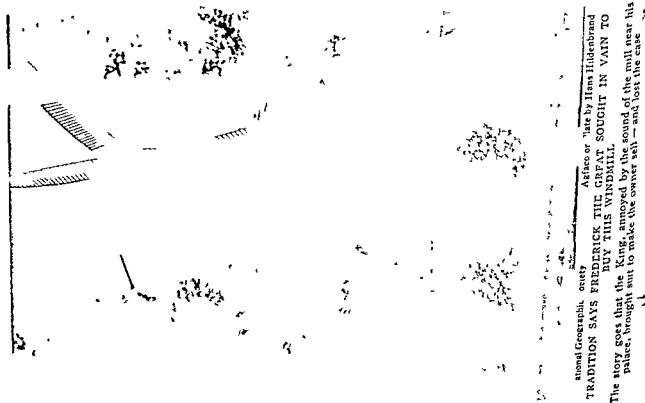


© National Geographic Society

Enslay Photographs by Wilhelm Toben

IN SUMPTUOUS GLITTERING DAYS OF EMPIRE SANSsouci PARK WAS
 A SHOW PLACE OF EUROPE

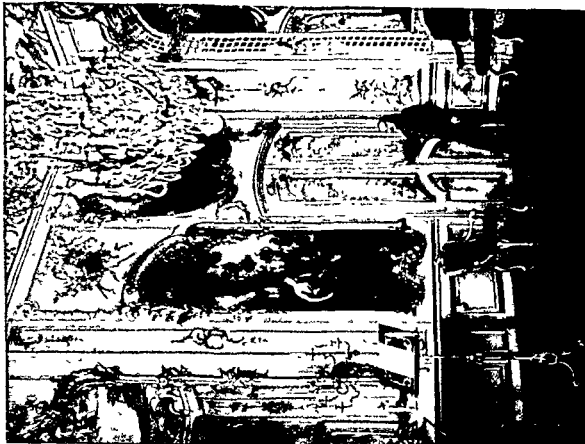
To the French Ambassador Frederick the Great once complained that oranges did not thrive here
 Maybe not flashed the Frenchman diplomatically but Your Majesty's laurels do!



ational Geographic society

As place or "late by Hans Hildenbrand
**TRADITION SAYS FREDERICK THE GREAT SOUGHT IN VAIN TO
 BUY THIS WINDMILL**

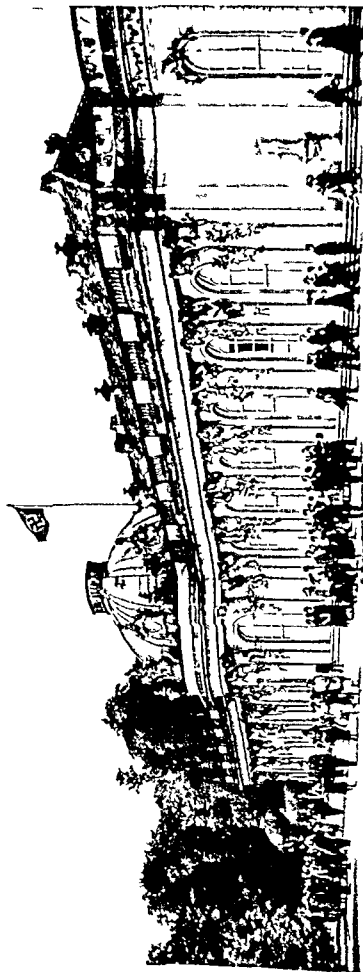
The story goes that the King, annoyed by the sound of the mill near his
 palace, brought suit to make the owner sell — and lost the case



Finlay Photograph by Wilhelm Tobien

**HERE FREDERICK WENT TO PLAY HIS FLUTE AND
 ARGUE WITH VOLTAIRE**

At Potsdam, where Frederick William I painted portraits of his generals,
 his son, Frederick the Great, built this one-story palace (opposite page)



© National Geographic Society

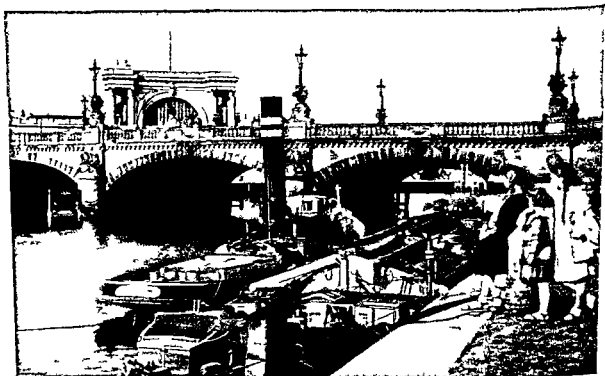
THOUGH ITS IMPERIAL POMP AND GLORY ARE FADED, VERSAILLES PALACE REMAINS AN OBJECT OF CURIOSITY TO SICILITANS. For 40 years this was the almost constant home of Germany's eccentric Frederick the Great. Now by his greyhounds are joined Frederick I in the palace at 20 minutes past two on the morning of August 17, 1786, and at that very moment his clock legend says stopped running never to go again.

Photograph by Wilhelm Tönnies



WARSHIPS TANKERS FREIGHTERS LINERS—YOUNG GERMANY LEARNS TO BUILD THEM
ALL IN THIS SHIP MODEL SCHOOL AT POTSDAM

Fascinatingly like real full sized craft are these model vessels built on a scale of 1 to 20. At the left is a Lilliputian version of Germany's 10,000-ton pocket battleship 'the *Deutschland*'

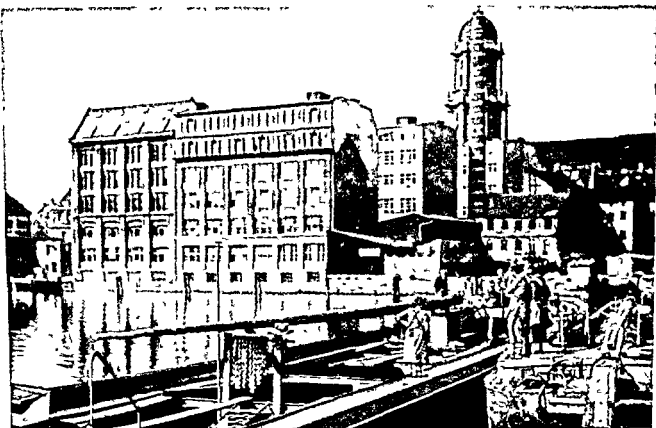


© National Geographic Society

Finlay I. photographs by Wilhelm Toben

LIKE A WIDE ARTERIAL STREET OF WATER THE NAVIGABLE SPREE CARRIES COMMERCE
INTO THE HEART OF BERLIN

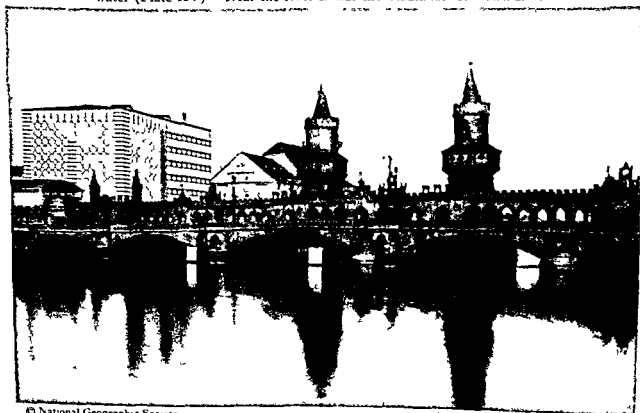
Tugboat and barge are tied up near important freight depots—busy Humboldt Hafen lies not far from the Lehrte Railroad Station which rises beyond the Moltke Bridge



Finlay Photograph by Wilhelm Tobien

NEXT-DOOR NEIGHBORS FOR AN HOUR RIVER BOATS TIE UP ALONGSIDE AND FLOATING HOUSEWIVES EXCHANGE GOSSIP

Warehouses and factories are clustered along the Spree to take advantage of cheap transportation by water (Plate XV) Near the river stands the Stadthaus or Town Hall

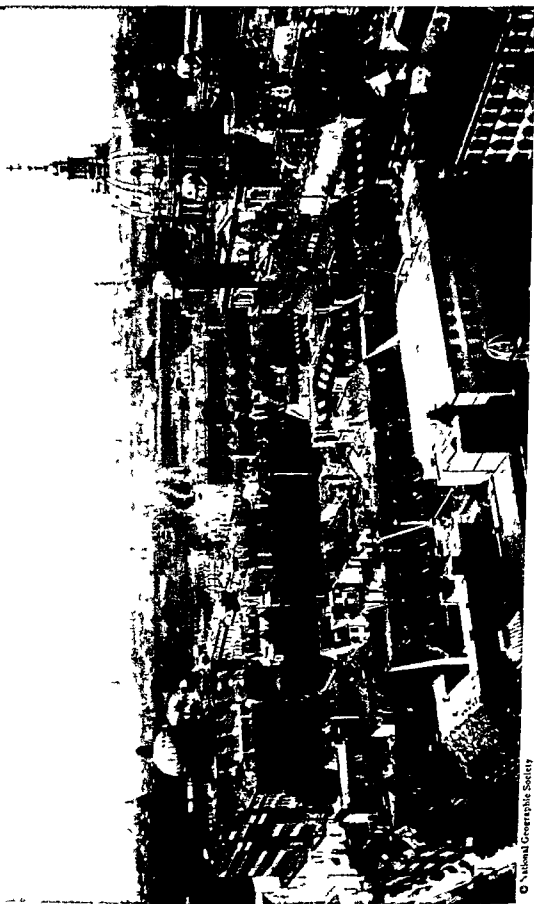


© National Geographic Society

Aefacolor Plate by Hans Hildenbrand

RIVERS AND CANALS TIE BERLIN TO MUCH OF WESTERN EUROPE AND HELP MAKE IT A TEEMING TRADE CENTER

Spanning the Spree is the sturdy Oberbaum Bridge with its towers built forty years ago Beside it at the left is a modern preserving plant which holds literally millions of eggs



© National Geographic Society

BERLIN WITH MORE THAN 4 200 000 INHABITANTS IS THE WORLD'S FOURTH LARGEST CITY

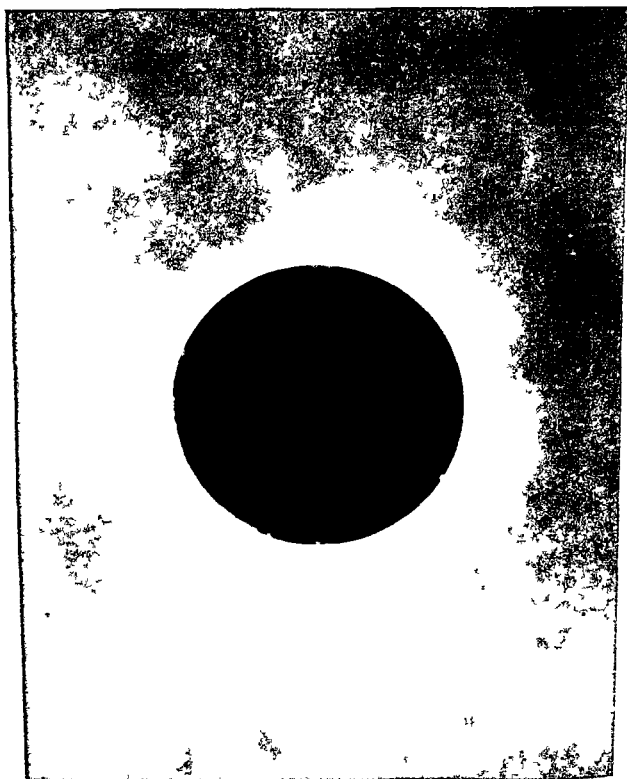
Aerial color Plate by Hans Hildenbrand

Only New York, London, and Tokyo exceed the German capital in population. Though mentioned in history as early as 1337, Berlin is essentially a city of modern times, having grown enormously in the last century. In the distance stretches Unter den Linden with its old trees since destroyed (plates III and IV). At the right appears the Cathedral (plate I), at the left the Schloss, former palace of the Russian kings, now a museum (plate II).



© National Geographic Society

PRODIGIOUS QUANTITIES OF COAL GRAIN AND OTHER VITAL FREIGHT MOVE THROUGH BERLIN'S VAST HARBOUR. Since Hamburg Berlin Rhine cities and others are tied by canal and river traffic, the inland waterway system here much resembles China's in importance to trade. River workers' families live on the boats as in the Orient (Plate VIII).



© National Geographic Society

Dulay color photograph by Irene C. Claiborne

IN THE FIRST NATURAL COLOR PHOTOGRAPH OF AN ECLIPSE EVER REPRODUCED THE CORONA FLARES INTO VIEW AS THE MOON BLOTS OUT THE SUN

Normally invisible because of the sun's greater brilliance, the corona's blazing gaseous mass is always present, but cannot be seen except during a total eclipse. The most striking feature of this spectacular is that the sun's chromosphere (a layer of incandescent gas whose lower left-hand edge is not yet eclipsed) and the bright prominences rising from around the sun appear bluish white instead of red as heretofore depicted. The notches in the moon's rim are not real, but are caused by light streaming from the prominences. This one second exposure was made by the National Geographic Society's official Bureau of Standard Expedition on June 19, 1936, at Ak Bulak, U. S. S. R.

OBSERVING AN ECLIPSE IN ASIATIC RUSSIA

By IRVING C. GARDNER

Leader of the National Geographic Society National Bureau of Standards Eclipse Expedition

UNDER the sponsorship of the National Geographic Society and the National Bureau of Standards it was my good fortune to observe in Asiatic Russia the solar eclipse of June 19, 1936. Excellent weather conditions permitted the making of satisfactory photographs of the solar corona in black and white and also in color. This successful outcome enables THE NATIONAL GEOGRAPHIC MAGAZINE to reproduce the first natural color photograph of a total eclipse ever published (opposite page).

Observation of a total solar eclipse is one of the most thrilling gambles of scientific research. After elaborate and highly specialized apparatus has been built, taken possibly a third or halfway around the world and set up with meticulous care the best that can be hoped for usually is two or three minutes of observing time.

Even that outcome is entirely dependent upon the caprice of the weather. A tiny cloud over the sun may spoil everything. Dame Nature must have been in a truly sporting mood when she provided the eclipse-producing mechanism for the earth.

ECLIPSES FREQUENT ON JUPITER

She did much better for Jupiter. Jupiterians if there were such people would be well supplied with solar eclipses by the several moons large enough to produce them frequently. In fact it is not unusual for two or three total solar eclipses to be proceeding on Jupiter at the same time.

From the earth with a telescope of moderate size one may see the black, approximately circular shadows of the satellites as they travel across the disk of Jupiter. These shadows represent regions of total eclipse on that planet.

The earth however has only one moon. Its orbit and size are such that it appears slightly smaller than the sun when it is most remote from the earth and a little larger in its nearer positions. Its path comes directly between the earth and the sun only at rare intervals. Then if it is sufficiently near the earth to blot out the sun entirely its elliptical shadow lying on the earth is the area within which the sun is totally eclipsed.

As a result of the rotation of the earth and the apparent motions of the sun and

moon this elliptical shadow sweeps over a long narrow strip extending approximately a third of the way around the earth. Only along that path is a total solar eclipse visible.

Eclipses seem to have a predilection for visiting inaccessible places. The coming eclipse of June 8, 1937, for example, will have a maximum duration of seven minutes and four seconds in extraordinarily long period but the region from which it can be viewed lies almost entirely in the Pacific Ocean and there are only a few small islands which afford sites for eclipse expeditions.*

The eclipse of 1936 was much more accommodating. It was total over a narrow shaded strip beginning in the Mediterranean south of Italy, crossing Greece and Soviet Russia and ending in Japan. In central and eastern Siberia the only territory conveniently accessible was that along the Trans-Siberian Railroad; indeed the central line of this eclipse path followed the railroad so closely as to cross it five times.

An early problem of an eclipse expedition is the selection of a site.

Near the middle of this strip of territory the eclipse would be at noon, an advantage because of the height of the sun at that hour and the consequent increased duration of the eclipse. The probabilities of fair weather however had also to be taken into consideration.

SITE STUDIED TWO YEARS IN ADVANCE

The U. S. S. R. Government generously authorized a study of the advantages and disadvantages of different possible locations for eclipse expeditions. This study was made two years in advance of the eclipse and the results were published in English by Dr. B. P. Gerasimovic and Dr. H. J. Šerbakova and by Dr. A. Michailov. These publications enabled foreign astronomers to compare the advantages and disadvantages of different parts of the total eclipse region lying within Russia.

Taken into consideration were the probability of a clear sky, temperature freedom from dust storms, freedom from strong winds which might shake the instruments.

* See "The Society's New Map of the Pacific by Gilbert Grosvenor," NATIONAL GEOGRAPHIC MAGAZINE, December 1936.



Photograph by Meriel M. Gardner

ADDRESS "LATITUDE $51^{\circ} 1' N$, LONGITUDE $55^{\circ} 39' E$ "—AND THE MAIL CAME THROUGH WITH ONLY THAT DESIGNATION!

An American built radio station was parked between the two 'hotel cars. A laboratory in the baggage car center enabled men of the Harvard M I T group to study the effect of the eclipse on radio transmission. One night they talked to an amateur in England and soon were besieged with calls from other Britishers who had listened in. The scientists broadcast their location in astronomical fashion and received letters with no other address than the latitude and longitude above. The sleeping car next to the two porters contained the dining salon.

convenience of living conditions, and many other factors.

The village of Ak Bulak, in Asiatic Russia, was selected as an observation site. This village, in the Autonomous Kazak Republic, situated about 60 miles south east of Orenburg, where the Kirghiz Steppe begins, could be reached conveniently from Moscow (Moskva), and the probability of fair weather there was high.

The Harvard Massachusetts Institute of Technology and Pulkovo expeditions had selected the same site—a real advantage to us because our work, which was limited to corona photography, did not overlap that of the other two observatories. Thus the different expeditions could be of material assistance to each other.

Prof. Donald H. Menzel, leader of the Harvard M I T expedition agreed to our plan, and the U S S R Government through Dr. Gerasimovic, Director of the Pulkovo Observatory at Leningrad, gave Mrs. Gardner and me permission to enter

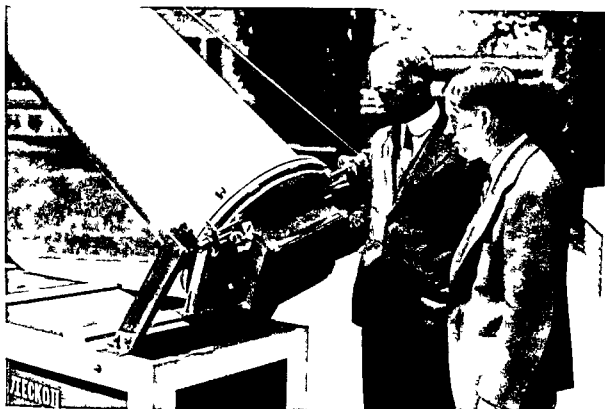
the Soviet Union as scientific observers and to bring in instruments for use at Ak Bulak.

A HALF TON OF EQUIPMENT

Even for our modest expedition approximately a half ton of scientific apparatus and camping materials was transported as personal baggage, more than a third of the way around the earth and through many customs barriers.

Food and a complete camping equipment were taken because we were not certain what type of accommodations might be available. Photographic chemicals were weighed out ready for use, and the photographic plates had to be kept cool during the entire journey.

The publications mentioned (page 179) gave a careful and detailed discussion of the characteristics of the region in which Ak Bulak is situated. We knew that the probability of a clear sky was as good there as at any place along the eclipse path, that the dangers from winds and



Photograph by Charles Ma...

DR. LYMAN J. BRIGGS AND THE AUTHOR INSPECT THE CAMERA'S BUSINESS END

Dr. Briggs, Director of the National Bureau of Standards at Washington, D. C., examines the clockwork mechanism which slowly moves the boxlike plateholder so that the photographic plate follows the sun's motion, thus making it possible to take time exposures of the eclipse. The clockwork is driven by a weight attached to the wire. The telescope is set up for a test in the grounds of the National Bureau of Standards where the camera was made and where optical glass was manufactured, ground and polished for the 9-inch lens, especially designed for photographing the sun's corona (Color Plate XVI and pages 182-183).

dust storms were not so great as at points nearer the Caspian Sea and that the village was accessible.

We also knew that Ak-Bulak was approximately eight or nine miles from the center line of the eclipse. But we did not know whether we should stay at an eclipse camp near the center line or whether we should live at Ak-Bulak and make daily trips to the camp.

The only obtainable description of our base of operations was

Ak-Bulak (51° 1' N 55° 39' E)—a station on and to the south on the Orenburg-Tashkent railroad 17 km from central line (of eclipse). Administrative center of a small district; power stations; meteorological station; good water; hospital; railroad mechanical shops, etc.

In making our plans it was natural to think of Russia as a cold country. Michael Strogoff, Napoleon's Retreat from Moscow, Anna Karenina in the motion pictures and other stories have emphasized

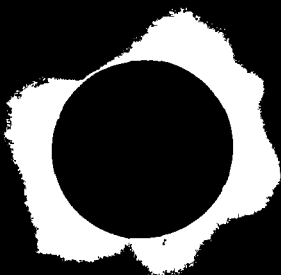
the snow and wolves which one is apt to believe are characteristic of the U. S. S. R. at all times. For some reason Russian summers seem not to figure prominently in our fiction.

FROZEN RUSSIA PROVES TO BE WARM

Actually when we arrived at Ak-Bulak we found ourselves in a very warm country, entirely without natural shade and with midday temperatures of 90 degrees Fahrenheit or higher. Fortunately although the elevation was not great the hot days were followed by cool nights.

In Washington, D. C., our apparatus was completed, tested and packed, and we started out with high hope that the big gamble on the weather would be successful.

We went by way of Berlin and Warsaw (Warszawa), entering Russia at Negorelo near Minsk. Soon after passing through the large arch which signals entry into the country, we arrived at the station and customs housed in a modern building.



Photograph by Irvine C. Gardner

PEARLY WHITE, THE CORONA'S IRREGULAR SHAPE VARIES FROM YEAR TO YEAR

By contrast with it, the moon's face during a total eclipse seems a much deeper black than ordinarily is seen in any black object on the earth. This one second exposure was one of eight shots," six in color and two in black and white made with the big eclipse camera of the National Geographic Society-National Bureau of Standards Expedition (Color Plate XVI and opposite page)

with a spacious, conveniently arranged room for the examination of baggage.

The routine here was much the same as in other countries, except that magazines and written matter were perhaps more closely scanned.

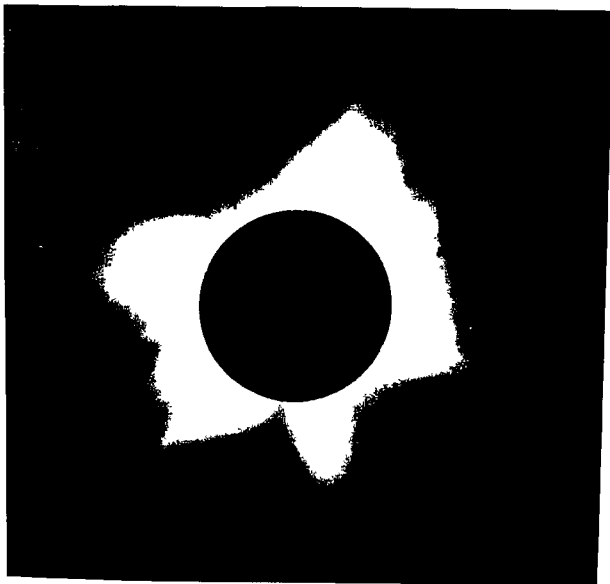
The English speaking representative of Intourist (the Soviet travel agency) met us with the welcome news that the chests containing our telescopes and equipment had been received and forwarded to Ak-Bulak.

From Negoreloe it was an overnight journey to Moscow.

From Moscow we proceeded directly to Ak-Bulak. This village lies approximately

eight hundred miles southeast of Moscow, on the railroad which extends to Tashkent and Samarkand. Dr. B. Novakova (Miss Novakova) and a student, who were the advance members of the eclipse party from the Prague (Praha) Observatory, which was to be stationed at Sara, accompanied us as far as Orenburg.

We were elated when we learned that a special car was provided for us four observers. Also aboard it were our Intourist English speaking guide, a porter, and a brakeman. This special car was to serve as a hotel at Ak-Bulak for us and for others who were to arrive later. The car had a salon at the end and, being last on



Photograph by Irvine C. Gardner

GAUZELIKE STREAMERS OF THE CORONA SHOOT OUT MILLIONS OF MILES

If the earth could be pictured in these flames it would appear approximately the size of the period at the end of this sentence. Some of the streamers extend beyond the limits of the photograph (page 192). Scientists believe that the corona holds clues to the composition of the sun whose heat and energy make life possible on earth. This 10 second exposure reveals a much greater extension of the corona than is shown on the opposite page. The short projections from the moon's disk, a double one at the top and others on the sides and bottom, are the prominences which are incandescent hydrogen.

the train furnished us with a fine observation place

RUSSIAN PLAINS RESSEMBLE THE AMERICAN MIDDLE WEST

The country which we saw on this journey reminded us in its physical characteristics of the American Middle West. We were traveling through a vast prairie which was then very hot with the evidence of rainfall decreasing as we proceeded. Many river beds which evidently carry large streams at certain times of the year were dried up beds of sand.

When we reached Ak Bulak, our additional car was greeted with enthusiasm by members of the Harvard group. They already had been there approximately three weeks and needed the additional sleeping quarters into which they might expand from their original and much overcrowded car.

With our arrival the rolling stock which constituted the hotel consisted of two sleeping cars, each of which contained a saloon in addition to the sleeping compartments, and a baggage car located on a temporary siding not far from the station.



Photograph by Irvine C. Gardner

TRUCKLOADS OF FARMERS CAME FROM MILES AROUND TO VISIT THE ECLIPSE CAMP

The solar phenomenon of 1936 made their remote corner of the world a goal for observers from distant America. Here one of the Russian astronomers (in dark coat and cap upper right) demonstrates the scientific apparatus. Behind the two girls foreground is the clockwork driving mechanism for one of the Russian-made instruments used by the Pulkovo Observatory's expedition which camped near the Americans.

The baggage car was the laboratory of the four radio men from Harvard. They had brought equipment for studying changes in the ionosphere which might be indicated by changes in radio transmission during the eclipse.

At this time approximately three weeks before the eclipse the party consisted of the radio men, six members of the Harvard astronomical group, and the two members of our expedition*. About a week before the eclipse others began to arrive.

One car had a small galley which served as a kitchen for warming the food and washing dishes. The salon in this car was both dining room and living room. Our meals were prepared at the restaurant in the railroad station and carried to the car.

* Besides Mrs. Gardner and the author there were Professor and Mrs. Donald H. Menzel and Mr. Henry Hemmendinger of the Harvard Astronomical Observatory; Prof. Joseph C. Boyce of Massachusetts Institute of Technology; Prof. Robert d'E. Atkinson of Rutgers University; Prof. Wallace R. Brode of Ohio State University; Mr. H. Selvidge; Mr. Paul King; Mr. J. A. Pierce; and Mr. E. P. York, of the Craft Laboratory of Harvard.

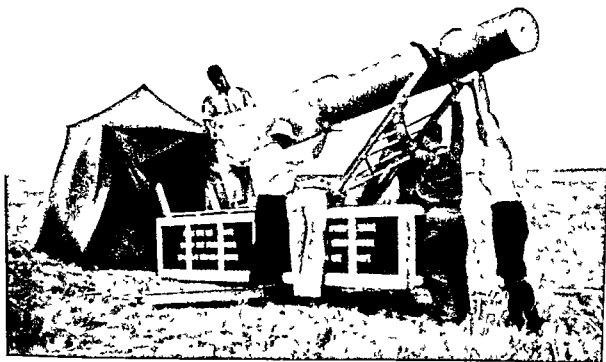
to be served. We did not need the food which we had brought with us and much of it came back to the United States unopened.

We found Ak Bulak, with its Eastern flavor, an interesting village. The Kazaks, most of whom were genial, are Turkish in origin, with nomadic traits. We never tired of watching them. It seemed impossible that so many different combinations of clothing could be worn, always with an Oriental touch.

The population in the village was divided, perhaps about equally, between the Russians and the Kazaks, who have separate schools. In the Russian schools Russian is taught as the native language and Kazak as the favored foreign language. In the schools attended by the Kazaks the situation is the reverse.

The Kazak language is entirely different from Russian and has an alphabet resembling the Arabic in appearance.

Immediately after our first dinner in Ak Bulak, we started on a tour of the town. Because of its northerly location, the



Photograph by Mervel M. Gardner

SETTING UP THE ECLIPSE CAMERA WAS LIKE GETTING A LONG RANGE GUN INTO ACTION

Neighbors from the Harvard University Massachusetts Institute of Technology camp helped Dr. Gardner erect the 14 foot aluminum telescope on an ancient burial mound about nine miles from Ak Bulak. The upright support had been constructed in Washington D. C. of the proper length to aim the camera point blank at the sun at the moment of eclipse (page 194). The tent sheltered working parts of the instrument and housed Dr. and Mrs. Gardner the night before the eclipse.

twilights are long. We had therefore, plenty of time to see the hospital, the apartments being built for the railroad workers and a number of private homes under construction. There appeared to be a mild building boom in the town.

We watched the builders make the molded blocks from clay and straw, and saw the piles of blocks which had been sun-baked. Some workers were laying the blocks into walls and others were roofing their houses with adobe supported by poles.

ADOBE HOUSES ARE "AIR CONDITIONED"

The houses are built in a workmanlike manner with the corners square and the walls plumb. After the blocks are laid the walls are plastered inside and out, and the exterior is 'whitewashed' the base of the wall being generally brown and the upper part white.

Window and door frames of the more ornate houses are decorated with elaborate and finely detailed fretwork. Lumber which has to be brought a long distance at

considerable expense, does not make suitable building material for the extremes of the climate. The thick walls and small windows of the adobe houses keep the interior surprisingly cool in the summer and warm in winter (page 186).

As we continued our walk, we saw some of the villagers enjoying the cool twilight sitting on their front "porches," adobe ledges built across the fronts of the houses about a foot from the ground. We admired the newly whitewashed exteriors and the clean courtyards which belonged to each peasant's home.

It is not easy to grow grass or flowers in this semi arid sand, but in front of many of the houses were circular plots of well fertilized soil in which trees had been planted.

At many windows were geraniums, begonias, or other flowering plants. The homes were laid out along very wide, straight streets some of which had a fairly good covering of grass, but most of them were too sandy for grass.



Photograph by Irene C. Gardner

DRIVEN LIKE A HORSE IN HARNESS THIS 'SHIP OF THE DESERT' BRINGS WATER TO THE EXPEDITION CAMP

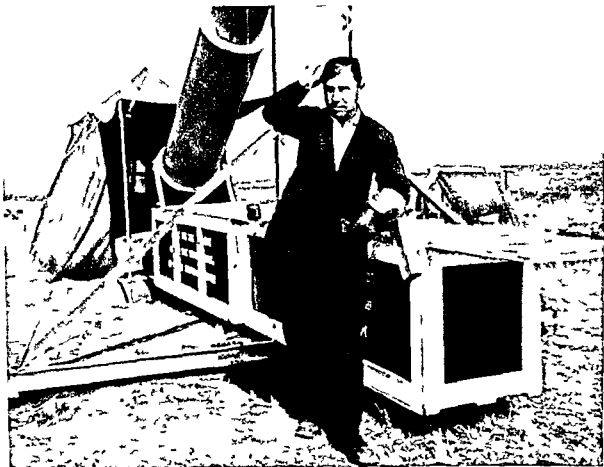
Much of the treeless steppe country is virtually without water most of the year. The eclipse expeditions supply for photographic purposes was obtained at holes remaining from a dried up river. drinking water was brought in carboys from Ak Bulak.



Photograph by Merrill N. Gardner

HANSEL AND GRETEL MIGHT MISTAKE THIS AK BULAK HOME FOR THE OLD WITCH'S GINGERBREAD HOUSE

Its walls however are of clay and straw blocks plastered and whitewashed and the elaborate fret work is cut in wood (page 185). These adobe houses are cool in summer and warm in winter.



Photograph by Merril M. Gardner

NIKOLAI AND A RUSSIAN BUILT FORD WERE ASSIGNED BY THE GOVERNMENT TO
SERVE THE EXPEDITION

'He had great faith in our ability to learn Russian says the author and taught us many words by a skillful use of the sign language on our trips between Ak Bulak and the eclipse camp (page 188)

Our walk led to a little river partly obscured by some of the few trees of the region. A small cart carrying a barrel and drawn by a bullock had been backed into the stream by two boys who were filling the barrel with water using their hats and their hands. The road passing through the stream and winding up one of the few hills of this region provided a delightful background for the scene.

From the hilltop the town extended before us with its pleasing contrast of white-washed homes and blue haze. We heard the European cuckoos calling to each other in the willows along the river. Much more familiar with clocks than with cuckoos we decided that the cuckoos cleverly imitated our well known Swiss clocks.

Although Ak Bulak has a population of 9 000 it did not, with its small business section appear to be as large as an American city of that size. The public bath was an adobe building with hot shower and steam baths. There was an abundance of

hot water, and a tub was added for the use of the eclipse group.

The electric light plant was driven by a Diesel motor. A grain elevator, a grist mill, a telephone system, a bank, several stores, a barber shop and railroad shops completed the business district.

THE "HOUSE OF CULTURE AND REST"

Each Russian town now has its park with a clubhouse or House of Culture and Rest as it is called. We passed two pleasant evenings in the one at Ak Bulak. Trees had been plentifully planted in the park and there were the usual opportunities for chess, pool, dancing, and amateur dramatics.

The play we attended was didactic and taught that a wife should not be required to work in the kitchen if she has talent for a professional career. In this drama it developed that the husband and wife were both architects and the wife was much the more talented of the two.



Photograph by Irv. C. Gardner

LUNCHEON IS INFORMAL, AND SO ARE CLOTHES, WHEN SCIENTISTS MEET ON THE STEPPES

Mrs. Gardner and members of the Harvard M. I. T. group enjoy a meal which was sent out from Ak Bulak, warmed at camp on a portable gas stove and served on packing boxes marked with the Harvard H. Behind the tent the author's camera is aimed at exactly the right angle to shoot the eclipse so that none of the 117 second, of totality need be wasted in making adjustments.

The native Russians were as cordial and friendly with us as they could be with the language barrier. A few who spoke German were most helpful; we could talk with them freely. Our chauffeur never missed an opportunity to teach us Russian words by means of an ingenious sign language as we traveled back and forth between Ak Bulak and the eclipse camp (page 187).

CAMELS DRAW MOWING MACHINES

Transportation in Ak Bulak takes varied forms. On one of our trips to the camp

a motor truck, our Russian built Ford, and three low-wheeled carts, one drawn by a horse, one by bullocks, and one by a camel arrived at a crossroad about the same time. Mules also are used.

We were rather nonplussed at first when we saw camels, the "ships of the desert," ignominiously drawing mowing machines. Russian built tractors and combines were available on the farms, and we saw numbers of them passing through on the trains for more distant points.

Ak Bulak was approximately nine miles from the center of the total eclipse zone. For convenience we maintained our headquarters in the group of cars in the village, but the eclipse apparatus was set up on a hill, which was

really an ancient burial mound, only a short distance from the center line of the eclipse.

CORONA STREAMERS MAY BE MILLIONS OF MILES LONG

When we first arrived at this eclipse station or camp the piers for the instruments for the three expeditions—the Russian, the Harvard, and our own—were in place. The common building containing two dark rooms was under construction and the Harvard tents were erected.

The diameter of the sun is approximately

864,000 miles. From its surface flamelike masses of incandescent hydrogen, termed prominences, reach sometimes several hundred thousand miles. Extending much farther from the sun is the corona, a gaseous mass irregular in shape, which has streamers that are often millions of miles in length.

The prominences and the corona are always present, but usually they cannot be seen because they are masked by the greater brightness of the sun, just as the stars are made invisible in daytime.

At the time of a total eclipse the moon, very accommodatingly, cuts off the direct light proceeding from the sun and, against the relatively dark sky, the corona stands out so brilliantly that it can be seen with the unaided eye.

Near the middle of the last century a method was discovered for viewing the prominences by means of a spectroscope attached to an astronomical telescope, and it is no longer necessary to wait for eclipses to study them. They are photographed daily, as a matter of routine, at Mount Wilson and other observatories.

The corona, however, has remained more elusive. Despite much effort and many attempts, no very satisfactory information regarding it can be obtained except during a total eclipse.



Photograph by Irvine C. Gardner

TOWNSFOLK HURRA TO MARKET, AND THE YOUNGER GENERATION GOES, TOO

"It is not easy to grow grass or flowers in this semi arid sand," writes Dr. Gardner, "but in front of many of the houses were circular plots of well fertilized soil in which trees had been planted." Some of Kazakhstan's towns have mushroomed as fast as American prairie centers, and have motion picture theaters

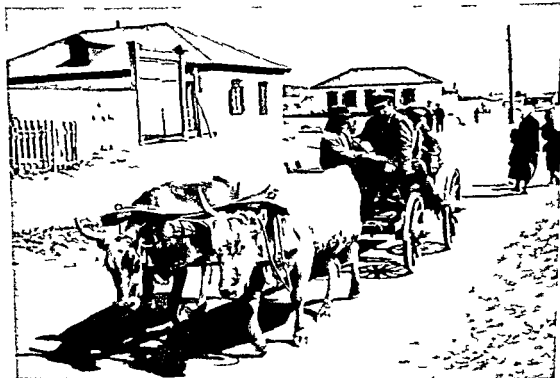
It requires approximately an hour for the moon to travel across, and completely cover, the sun's disk. During this period the sun appears as a crescent gradually growing thinner, and a strange twilight fades rapidly into darkness. At the instant that the crescent disappears, the corona and the prominences become visible in all their glory (Plate XVI and pages 182-3).

The character of the corona varies from year to year. At this eclipse it was characterized by streamers several times as long as the diameter of the sun. On the



THIS LITTLE COLT GOES TO MARKET WITH ITS MOTHER

The wooden arch to which a checkrein is attached over the mare's neck holds the wagon's shafts in place. To enter an Ak Bulak home one passes through the gateway into a courtyard.



Photographs by Irvine C. Gardin

LIKE A CIRCUS PARADE IS AK BULAK'S TRAFFIC WITH MANY KINDS OF MOTIVE POWER

This team of yoked bullocks arrived at an intersection at about the same time as the expedition's Ford, a motor truck, a horse and wagon, and a camel-drawn cart. The community has several trucks and tractors used for farming and in other Government work.



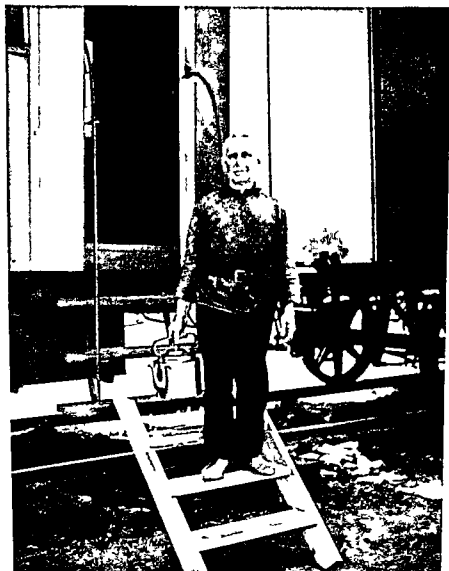
ON THE STEPPE A SCIENTIST EXPLAINS THE ECLIPSE TO VISITING COUNTRYFOLK. Many of these Russians are descendants of pioneers who began to colonize the vast grasslands of northern Kazakhstan at about the same time that the American plains were being settled



Photographs by Irvine C. Gardner

A 'RECEPTION COMMITTEE 800 STRONG WELCOMES THE AMERICANS

Here is only part of the crowd of workers who dressed up in their "rest day" clothes and greeted the scientists in front of their schoolhouse near Ak Bulak. An American bull owned by the collective farm was proudly shown to the visitors



Photograph by Irv ne C. Gardner

THIS 'HOTEL ON WHEELS' HOUSED THE ECLIPSE EXPEDITION AT AK. BULAK.

Containing sleeping quarters and an observation salon the special car provided by the Soviet Government brought Dr. and Mrs. Gardner from Moscow to their goal in Kazakstan north of the Caspian Sea (page 182). Another car was devoted entirely to shower baths for the two American expeditions. Here one of the porters is on his way to fill a kettle with boiling water, supplied free to passengers at virtually every station in tea loving Russia.

original negatives from which the illustration on page 183 was made, the streamers extend beyond the limits of the plate.

After about two minutes the moon, continuing its motion relative to the sun, exposes the crescent of the sun on the side opposite that where it had previously disappeared and the period of totality is over. Approximately an hour later the moon has passed entirely from in front of the sun and its entire disk is again exposed.*

prominences are flames of incandescent hydrogen playing on its surface. The spectra tell us of the composition of the sun and also furnish important information regarding the chemical structure of the elements on our earth.

* See *Photographing the Eclipse of 1932 from the Air* by Capt. Albert W. Stevens and *Observing a Total Eclipse of the Sun* by Paul A. McNally. NATIONAL GEOGRAPHIC MAGAZINE November 1932.

Why should the astronomer be sufficiently interested in an eclipse to conduct such expensive studies of the corona, prominences and solar spectra? There is no immediate utilitarian purpose served by these observations. The impelling motive is curiosity, but it is an intelligent and justifiable curiosity.

THE IMPORTANCE OF THE SUN

Almost all the energy on the earth has been given us by the sun. When we burn any of our fuels, utilize water or wind power, or enjoy the pleasant outdoor climate we are using energy that has come directly from the sun or that has been received from it during the past ages.

The corona is a mantle, in some places millions of miles thick, surrounding this all important celestial body. The

Having once learned that advantageous study of these phenomena may be made at the time of an eclipse, it is difficult to see how eclipse observations can be neglected. Many of the greatest contributions that science has made to the convenience and pleasure of life date their beginning to the observation, by research scientists, of phenomena which, like eclipse study, gave no promise of utilitarian value.

**DATA MUST BE
OBTAINED IN
A FEW MIN-
UTES**

The astronomer is interested chiefly in the phenomena which appear when the eclipse is total. He also is interested in the spectrum of the sun immediately before and after the period of totality. The sun's atmosphere is built up of concentric layers, and these are blocked out or exposed, one by one, as totality begins and ends.

The Harvard group had two large instruments, each carrying several spectrographs, which made photographs of the spectrum in rapid succession, beginning shortly before the period of totality and ceasing just after the period had ended.

By this procedure they were certain to record photographs of the "flash spectrum," which is the name applied to a



Photograph by Irvine C. Gardner

SWARTHY KAZAKS MINGLE WITH RUSSIANS AT AK BULAK'S MARKET

The genial natives are nominally Mohammedans, but the women go unveiled. This one wears a glittering earring and a tight headcloth to keep out dust. Kazaks (a branch of the Kirghiz) are of Turkish origin with Mongolian physical characteristics. Subjugated by Genghis Khan, they later became part of the Golden Horde, which overran eastern Europe in the 13th century. Many still live as nomadic herdsmen, but in regions colonized by Russians the Kazaks also have settled on farms.

characteristic spectrum obtained when the moon has covered all the surface of the sun except a thin layer referred to as the "reversing layer."

PHOTOGRAPHING THE CORONA

During the period of totality these spectrographs recorded the spectra of the corona and prominences. The astronomers from Pulkovo also concentrated on spectroscopic observations of the sun. We had

no apparatus of this nature, but we had a camera for photographing the corona

We used a camera with a specially designed lens, approximately nine inches in diameter, and with a focal length of 19 feet. The sun is of such a size that the diameter of its photograph is approximately one one hundredth of the focal length of the lens used to make the picture. Consequently, with our lens, the image was approximately two inches in diameter.

This lens combined a large diameter with a relatively short focal length. Several advantages arise from this arrangement. It is approximately ten times as fast as a lens of the same diameter, but with a focal length of 60 feet or more, such as is often used for eclipse work (page 181).

In other words a one second exposure with the shorter focal length is equivalent to an exposure of 10 seconds with the longer focal length. This is of considerable importance when one has less than two minutes available for making pictures.

The camera was built of aluminum and, with the relatively short focal length, it could be made compact and self-contained. The portability was still further increased by the design of the mount. The packing cases, which were necessarily heavy to withstand the long journey, were made to serve a double duty. After arrival at the eclipse station they formed the base for the mount (page 183).

The National Bureau of Standards within its own plant conducted all processes necessary for the conversion of sand and the other required ingredients into a finished lens. This construction included the production of the optical glass, the computation of the curvatures of the different surfaces, and the grinding and polishing of the four components of the lens.

CHECK—AND DOUBLE CHECK

During an eclipse, as at other times the sun and the moon are moving across the sky. Since all eclipse exposures are time exposures it is necessary to compensate for this motion if the picture is to be free from blur. This can be done by moving the entire camera to follow the eclipse by employing a mirror to reflect the image of the eclipse into the telescope and slowly turning the mirror or by moving the photographic plate so that it follows the image of the moving sun.

It seemed simplest to move the photo-

graphic plate, and this was done by a clock work device.

At Ak Bulak we had to erect the camera and point it so that it would be aimed directly at the sun at the proper time on the morning of the eclipse. Adjustment had to be exactly right for one cannot waste the few seconds of totality adjusting the telescope.

The latitude and longitude of the eclipse site had been known before the mounting was completed in Washington, D. C. Accordingly, the height of the sun at the time of the eclipse was computed and the two uprights supporting the upper end of the telescope tube were made of the proper length for this eclipse. With the mount specially designed in this manner, there was no difficulty in getting the telescope adjusted at the proper elevation. An adjustable level was used to check this.

The telescope also had to be pointed in the proper direction. The camp had already been surveyed when we arrived and stakes indicated the direction of the line pointing toward the eclipse. But no matter how great confidence one has in work of this character, everything must be checked and rechecked because of the terrible finality of a mistake before an eclipse.

The beam from the sun should come almost exactly down the center of the tube and form an image almost on the center of the ground glass used for focusing.

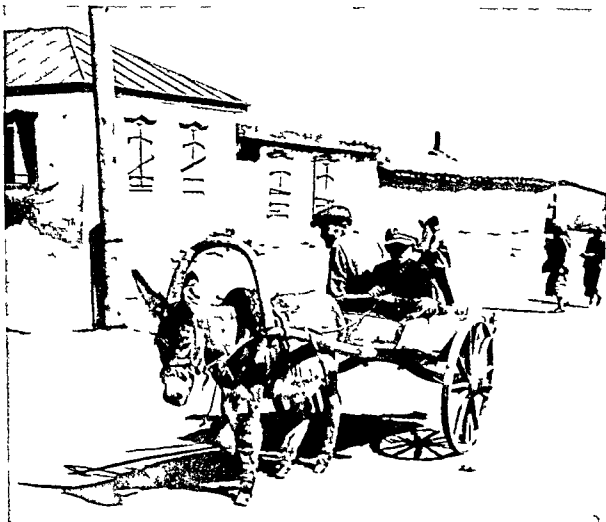
If clear days come shortly before the eclipse, the pointing of the telescope easily can be determined. The position of the sun at a given time of day does not change greatly in three or four days. Accordingly, each morning exactly at the time of the eclipse, the alignment of the telescope with respect to the sun was carefully checked.

The time was correctly known from a chronometer checked against time signals received by radio.

On these same rehearsal mornings the adjustment of the clockwork for driving the photographic plate was checked and adjusted until the image of the sun and the ground glass moved at exactly the same rate.

A DRAMATIC WAIT

The day and night immediately preceding the eclipse were full of dramatic interest. The entire eclipse party had arrived. Twenty-two Americans were on



Photograph by Ivaue C. Gardner

A DROWSY DONKEY PLODS ALONG A STREET WHOSE SURFACE IS LIKE BEACH SAND

Window shutters on the tin roofed house are tightly closed as protection against dust storms which blow up nearly every afternoon at Ak Bulak. The dust hazard was lessened at the eclipse camp where grass kept the wind from stirring up dirt.

hand and seven scientific men in the Russian expedition from Pulkovo. All were interested in getting some final task completed.

The schedules and assignments for the work of the next morning were posted and distributed to the different members of the party. Rehearsals were in order and we practiced all the operations to be performed during the eclipse timing them by a stop watch to make sure that everything could be accomplished with the utmost precision in the precious 117 seconds which would be at our disposal if weather permitted.

The eclipse would occur at 9 16 a m local time * (11 16 the night before Wash

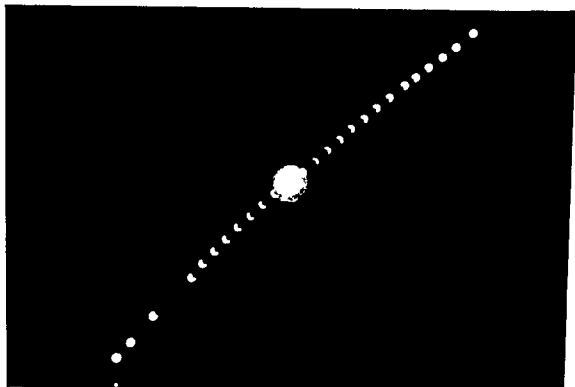
* The time used locally as that of the 75th meridian east longitude which was an hour ahead of their standard time

ington D C time) and it obviously was impossible for the available automobiles to bring all of us out from Ak Bulak in the morning in time for the eclipse. No one wished to chance being stranded away from the camp consequently everyone decided to stay at the camp that night.

There were satisfactory sleeping accommodations for only six or seven but that was not important. No one slept more than three hours and that much sleep can be obtained in almost any position.

LAST MINUTE PRECAUTIONS

A long table made from a box lid was set up in the black laboratory tent and boxes served as chairs. A pressure gasoline lamp gave good illumination. A few members of the party were outside working on the large instruments. The others were



Photograph by Merrel M. Gardner

"LIFE HISTORY" OF A SOLAR ECLIPSE

Old Sol shines as round faced as usual lower left in the first of this series of exposures made at five minute intervals but in the next "shot" the moon has begun to move between it and the earth. Swimming higher in the sky the sun gradually shrinks until in the central exposure it is totally eclipsed. Now the flaming corona becomes visible (Color Plate XVI and pages 182-183). In this exposure the moon's disk is hidden by light spreading from the corona. After nearly two minutes of totality a thin crescent of the sun appears and in approximately an hour the eclipse ends. This photograph was taken with a short focus camera, the third, fifth and sixth exposures were omitted as the scientists were busy with the big camera (pages 181 and 182).

around this table and so busily engaged that even the most loquacious said little.

There is always some added precaution to be taken. Placeholder can be dusted, the automatic mechanisms of the film magazines can be tested, motion picture camera lenses can be cleaned, and all photographic equipment has to be loaded with plates or films. This is postponed until the last night because it is safer to keep such material in the original sealed containers as long as possible.

For the American group, only one dark room was available and the different ones took turns using it. A member would return to the table with his loading completed and the next on the schedule would take his place. Such subdued conversation as there was concerned itself mostly with the weather prospects.

There had been several weeks of almost uniformly good weather, but the last few days had been distinctly unfavorable each

morning at the time of the eclipse. Would the coming morning be the same or would the sky be clear? All one could do was to carry on and hope for the best.

Three o'clock came, and the group began to separate. At five in the morning we heard a subdued conversation outside our tent.

MORNING AND AN OVERCAST SKY

Our worst fears were realized. Virtually the entire sky was overcast. We envied the radio crew in the village, who would conduct their researches upon the ionosphere unconcerned by the presence or absence of clouds. Despite the dark prospect all went ahead with their preparations as if assured of a perfect day.

By seven it had begun to clear in the east and to look as if there were a chance for a clear spot large enough to view the eclipse. By eight the clouds were so open in the east that it seemed certain some re-

sults could be secured. By nine all the clouds in the eastern sky had vanished!

The eclipse came and went.

Only a very few incidents of that 117 seconds stand out.

Two or three minutes before the eclipse I was mildly perturbed because so much less light seemed to be coming down the telescope tube than on the rehearsal mornings. Could it be that the telescope had been accidentally moved out of adjustment?

Immediately I realized that the light was absent because, this morning, unlike the rehearsal mornings, the sun was almost completely eclipsed.

At the instant totality began, the shutter was opened for the first exposure, and the stop watch was started. Eight exposures were completed before the sun again appeared. The longest exposure was 16 seconds and during this exposure, there was opportunity to take a good look at the corona.

For the quiet the evening before, everybody amply made up afterward. All were pleased with the excellent sky, and there were dozens of minor incidents to relate.

Outside the limits of the eclipse camp there were hundreds of Russians who had come to our mound. Shortly after the event they were all gathered in a large assembly listening respectfully to a speaker addressing them.

The occasion was an impromptu meeting in honor of Maxim Gorki who had died the day before.

During the day reports were received from the different stations telling of the weather and fortunes of the various expeditions which were distributed along the region of totality. In the evening there was a broadcast in which the different groups of observers participated.

That same night development of plates began and continued for three nights.

RESULTS OF 117 SECONDS OF WORK

When our plates were developed we were satisfied with the results of our two minutes of work. We made six exposures with color plates the lengths of exposure being 1, 2, 4, 8, 16 and 8 seconds respectively. Between the last two exposures with color plates two exposures of 1 and 10 seconds each were made on panchromatic plates registering in black and white. All of the exposures were successful.

From the black and white pictures measurements can be made of the manner in which the brightness of the corona decreases for the parts more remote from the sun.

The complete interpretation of the color films is not so direct and will, to some extent, have to await more careful study. They do not register detail as fine as that shown by the black and white negatives, and the corona and prominences did not possess enough color to give spectacular results.

Visual observation by Professor Menzel showed the prominences to be lavender or purple, instead of the usual brilliant red. This was satisfactorily confirmed by our color films, which show the prominences as blue or bluish white. In the first color film and, to a less extent in the two following, a portion of the chromosphere is not entirely covered by the moon's disk and it also appears blue (Plate XVI).

"HARD AND SOFT" TRAVEL

On June 22 we were invited to a dinner at Orenburg in honor of the astronomers visiting Russia.

For the trip we were provided with a special newly painted hard car attached to the afternoon train. Travel in Russia is characterized as 'hard or soft,' 'hard' cars having only seats without upholstery. On each bench in our car there was a mattress and a bedspread, all new and spick and span. Everybody made use of the mattresses.

We reached Orenburg about four in the afternoon and after a sight seeing trip gathered for the dinner. The speeches in English, Czech and Russian were translated afterward for all guests.

Upon leaving each family represented at the party was presented with an Orenburg shawl. Of fine, hand woven wool these shawls are world famous for their delicate structure. Although approximately six feet square they can be passed through a finger ring.

It required about four days to complete the development and the packing. The camp which had been the scene of such activity for six weeks became deserted.

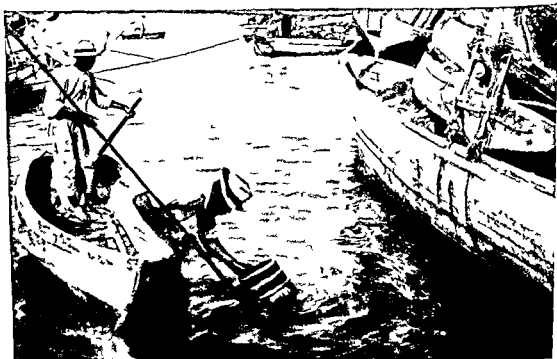
The next solar eclipse in this region is in 1941. Then astronomers will pass hurriedly through Ak Bulak to reach observation points on the same railroad in the neighborhood of Tashkent.



Photograph by Florence Thomas Miller

CONCH DIVERS SAILING THEIR BOATS TO GOOD CONCH GROUNDS

Headfirst over the side they plunge swimming deep to search the bottom for the big white shells. To remove a conch from its "house" natives knock a hole in the spire directly over the spot where the creature is attached. It can then be pulled out readily.



Photograph by Sands

"KEEP HER STEADY WHILE I HOOK THAT SPONGE!"

Peering through a water glass the sponger lowers a long handled hook and lifts the animal to the surface. Newly gathered sponges look like uncooked liver for a gelatinous substance surrounds the fibrous skeletal structure (page 219)

DENIZENS OF OUR WARM ATLANTIC WATERS

By ROY WALDO MINER*

VOYAGING southward from New York toward tropic waters on a midwinter day, we gaze out over a leaden sea of dull green color, lashed by the stiff, chilling wind. But the next morning we awaken to a balmy air and go on deck to behold the ocean miraculously changed to ultramarine blue, the dark swelling waves crowned with snowy foam which churns up in the wake of the vessel in turquoise turmoil before reaching the surface.

Petrels follow the ship, skipping from wave to wave. Toward afternoon a school of porpoises glides in and out of the sea in never ending chase, while flying fishes glinting in blue and silver, dart anxiously from the water and sail long distances flicking the wave crests with their tails to gain momentum.

We are in the Gulf Stream, that marvelous river in the ocean, which gives the North Atlantic its unique character and profoundly affects its temperature even as far as the North Sea, bestowing upon the British Isles and Scandinavia the inestimable boon of a chastened climate †.

We can imagine the surprise of Ponce de Leon when, sailing along the coast of Florida in 1513 he found his ship borne irresistibly northward in its current. We acknowledge the service rendered to sea men by Benjamin Franklin, who advised vessels bound for England to take advantage of its northeastward course.

THE GULF STREAM'S MAGIC TOUCH

The Gulf Stream exerts an influence on the spread and distribution of the marine life of the Atlantic which cannot be overestimated.

The main current warms the whole North Atlantic, and spurs setting in toward the coast have a striking effect on the distribution of floating life off the Middle

Atlantic States and southern New England. Here, however, the warm stream is separated from shore by colder waters forming what is known as the Cold Wall. South of the Grand Banks of Newfoundland it meets the icy Labrador Current which flows down from the north, bringing a northern fauna and making its influence felt along the shore, particularly north of Cape Cod.

The Gulf Stream, on the other hand, extends the range of many West Indian and other tropical species far to the northward during the summer, some of them being borne to the British Isles, so that the pelagic life of the mid Atlantic is more tropical in character than that of the same latitude on the North American coast.

LIVING FLEETS SAIL SUNNY WATERS

Let us sail out across the Gulf Stream in a southeasterly direction keeping our eyes open for evidences of its floating life.

It is a calm day. Our seagoing launch glides over quiet waters but the northeastward drift of the current is obvious.

Suddenly we see a graceful translucent object, like an oddly elongated bladder floating on the surface. It is brilliantly colored blue and crimson the hues more intense at its tapering ends and shading into a play of delicate transparent tints along its sides.

As we come nearer we see still others and soon we realize that we are steering into the midst of a fleet of these fairy craft. Each one erects a crest resembling a succession of iridescent foamlike bubbles along its summit bordered with an edging of deep crimson.

These are the Portuguese man of war (*Physalia pelagica*) an organism related to the hydroids and jellyfish but consisting of a whole colony of connected individuals floating as a unit (Plate II).

At first glance only one member of the colony is visible. But as we look downward through the transparent water we see masses of smaller tube shaped projections depending from its lower side just beneath the surface. The majority are deep blue while scattered here and there among them are clusters of salmon pink and fingerlike protuberances of green. Fringelike strings edged with bluish beads float out from this mass jerking spasmodically.

*This is the second of two articles by Dr. Miner, Curator of Marine Life, American Museum of Natural History, describing coastal creatures of the eastern seaboard. The first, "Sea Creatures of Our Atlantic Shores" with paintings by Else Bostelmann, appeared in THE NATIONAL GEOGRAPHIC MAGAZINE for August 1936.

†See "The Grindest and Most Mighty Terrestrial Phenomenon: The Gulf Stream" by Rear Admiral John Eliott Pillsbury, NATIONAL GEOGRAPHIC MAGAZINE August 1912.

Looking deeper, we finally perceive, extending far into the depths, a whole series of cordlike filaments spirally adorned with close set beads similar to those on the shorter strings but larger. These slender cables are continually extending and contracting independently of each other, thickened knots passing each other up and down on neighboring strands like elevators.

A sudden breeze ruffles the water surface. The floats change shape, twisting in such a way as to 'trim sail.' The long, submerged cables being attached to only one side of the bladder, act as a drag anchor, enabling the craft to head up into the wind and thus counteract a too rapid leeward.

A MAN OF WAR'S POISON GLANDS

On board the boat we have a tall glass jar. Reaching over the side as the vessel drifts with the current, we pick up a fine example of *Physalia*, being careful to lift it by the float and thus avoid contact with any of the bead adorned streamers. This caution is essential, for every bead is a battery of powerful sting cells loaded with minute barbed threads, thousands of which at the slightest touch will penetrate the skin and inject an irritating poison.

Once while wading near Ponce on the south shore of Puerto Rico I attempted to lift one of these creatures into a pail of water. The trade winds were blowing strongly, and as the streamers came clear of the surface the wind caught them and blew them around the bare arm with which I held the pail. Immediately a pain as of living fire shot through it.

I quickly dropped the *Physalia* into the pail and began to unwind the clinging streamers with my free hand. When I had finished each finger pained like a toothache. The arm was fiery red and swollen to the elbow, and my armpit ached where the poison had spread to the lymphatic glands.

I did not sleep that night and the pain passed away slowly during the next day. Fortunately I was not seriously affected but some people more susceptible have been known to collapse after being stung.

So we are extremely careful as we place our *Physalia* in our tall jar of sea water. The long streamers, which may extend as far as forty feet down into the sea immediately contract to two or three feet when the bladder is brought out of the water. In the jar they lengthen to its bottom and

begin their eternal contracting and extending.

The cluster of individuals immediately under the float is of several kinds, each having a special function.

The blue, tube shaped members are feeding polyps, with mouth openings at their lower extremity. They do the feeding and digesting for the entire community.

The green, tapering fingers are feelers and tasters very sensitive.

The finely divided pink clusters, reproductive in function develop the sex cells. Male and female cells are found only in separate colonies.

The streamers, of course, are fighting polyps, the longer ones, as above stated, having a stabilizing function as well. Fishes or other organisms that chance to swim against the streamers are immediately stung to death and drawn up by the contracting filaments to come in contact with the mouths of the feeding polyps which suck out the victims' body fluid digest the food and pass the excess on to the mouthless members of the colony.

UNHARMED AMID DEADLY STINGERS

A species of small fish the Portuguese man-of-war fish (*Aequorea victoria*) appears to be immune to the sting and seeks shelter among the tentacles from its enemies. In return, it perhaps acts as a lure for larger fish preyed upon by its host and doubtless nibbles at the feast. A similar habit of the butterfishes which associate with the red rayed jellyfish (*Dactyloctenidia aegyptiaca*) has been described in 'Sea Creatures of Our Atlantic Shores'.*

Other floating colonies related to the Portuguese man of war are occasionally seen in the Gulf Stream. Among them are the *Porpita* having a disklike float about the size of a silver quarter, bright blue in color, and the *Velilla* with a rectangular raft about two inches in length colored blue green and pink and with a curious elevated keel standing up cornerwise upon it.

PULSATING JELLYFISHES ABOUND

Jellyfishes also are abundant in these warm waters (Plate III). In fact the *Dactyloctenidia* above mentioned as well as the Portuguese man-of-war, are borne to the shores of New England by currents.

*See NATIONAL GEOGRAPHIC MAGAZINE, August 1936.



Photograph by Julius Kirschner

PHOEBUS GOD OF THE SUN DRIVES HIS CHARIOT ACROSS A HELMET SHELL

This exquisite carving is from the original Guido Reni painting *Aurora* exhibited in Rome. Before the chariot the Goddess of the Dawn sprinkles flowers over the clouds. Cupid bearing a flaming torch represents the morning star. For this work the artist chose the shell of a helmet conch instead of a queen conch (Plate IV) because the white exterior and brownish lining give more contrast than the white and rose of the queen conch (page 208). Mr. J. P. Morgan presented the shell cut in Italy to the American Museum of Natural History in New York City.

setting in from the Gulf Stream and the former has become established there as a regular inhabitant.

Another beautiful creature comes to the surface close to our boat and we capture it with a hand net. In a glass jar it swims with the utmost grace; its purplish brown umbrella pulsating rhythmically as it propels the creature through the water.

This is the purple oceanic jellyfish (*Pelagia cyanella*). It possesses the four long

ruffled mouth lobes familiar in *Dactylometra* and eight slender tentacles margin the umbrella which is further ornamented with numerous small wartlike knobs.

The mushroom jellyfish (*Stomolophus meleagris*) is smaller. Its almost globular brown to cream colored umbrella, unadorned with tentacles, gives it nearly the appearance of a swimming mushroom, an impression emphasized by the stemlike cluster of folded and scalloped mouth lobes.



Photograph by Roy Waldo Miller

"PLAYING POSSUM," BUT STILL FULL OF PEP

Unless one knows how to hold spiny lobsters correctly, their spines will lacerate the hands for the creatures struggle vigorously and flap their abdomens up and down. These were captured in traps but men often dive overboard and catch them with their hands. Crayfish now becoming scarce from overfishing are occasionally found in rock crevices at low tide (pages 204, 208 and Plate V)

furnished with numerous suckers which function instead of a mouth (Plate III)

COMB JELLIES FLASH PRISMATIC COLORS

As we look down through the water, we see, contracting and pulsating everywhere, the bubblelike globes of smaller medusae, so transparent that they are only momentarily visible as the light glints across their delicately tinted umbrellas and faintly outlined radial canals. Most of them are hemispherical but here and there are cuboid forms (*Tamora haplonema*), angular

in outline, with two or four tentacles at the corners

Among these lovely phantom creatures are certain species with iridescent flashes of brilliant prismatic colors playing in narrow lines over their otherwise nearly invisible surfaces. They are the ctenophores, or comb jellies, which form a group distantly related to the true jellyfishes (Plate III)

The flashes of colored light are caused by tiny propelling appendages shaped like infinitesimal combs, arranged in eight radial rows over the surface of the body. They move rapidly back and forth in ordered succession, the rays of light being diffracted into countless tiny rainbows by the unbelievably fine teeth with which each comb is equipped.

Most ctenophores have a pair of long, branched tentacles armed with sting cells. These appendages act as snares for small food creatures and may be retracted into transparent, pitlike sheaths.

A common species (*Pleurobrachia pileus*) has an oval body like a transparent plum. It is extremely widespread in the Atlantic, occurring from the Arctic to the Antarctic and from Europe to America. It swarms abundantly in the Gulf Stream, as well as close to the New Jersey coast, the Virginia Capes, and Cape Hatteras.

The powerful stinging tentacles are very destructive to small crustaceans such as copepods and shrimp, which are important factors in the food supply of many of our fishes (some of which, in turn, feed upon the ctenophores). The creature is therefore of considerable significance in the balance of life off our coast.

The Venus's-girdle (*Cestus teneris*) is one of the most striking of the ctenophore group. Its filmy body, bandlike in shape, resembles a transparent ribbon and is often three feet in length (Plate III).

As it swims undulating through the water its ends keep rolling and unrolling in scroll like fashion while the rows of comb plates along the margin shimmer

with iridescent colors, especially green blue and violet. This beautiful creature is more common in the Tropics but the Gulf Stream occasionally brings it northward as far as the southern New England coast.

CAPE COD ACTS AS BARRIER

Cape Cod and the Labrador Current together form an efficient barrier which prevents the more southern species such as these from reaching the northern New England region though some may be carried far north of this latitude toward Europe.



Photograph by Julius K. Schner from painting by Albert Operti

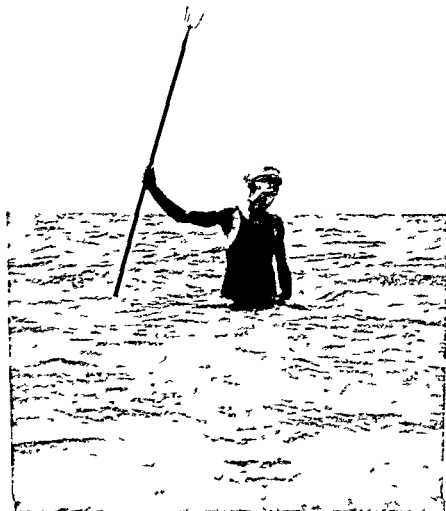
AN ARTIST'S CONCEPTION OF SEA LIFE IN A MANGROVE SWAMP

Clinging to the mangrove roots are coon oysters (just above water surface) and spotted cowries (lower left and left center). Beneath them rests a starfish. Three tube sponges rise from a root and near by crouches a slender legged spider crab. Beyond are living cup corals and sea fans. Careful scrutiny reveals many tiny brittle stars that lie flat on the bottom arms radiating in every direction.

On the other hand, Cape Cod because of its barren, sandy character also acts as a barrier to the northern shore fauna keeping it confined to the Gulf of Maine, Nova Scotia, and Labrador.

Nevertheless in recent years such species of mollusks as the indefatigable periwinkle, dog whelk, and buccle have slowly surmounted this obstacle and are now found on the coast of southern New England and Long Island Sound.

Warm and cold currents determine the spread of floating sea life, while barren



Photograph by Roy Walden, Maine

SPYHOUNDING CRAYFISH IS GREAT FUN, BUT DON'T STEP ON ONE!

Fishermen and sportsmen usually harpoon spiny lobsters, but sometimes they are caught in traps and boys even dive for them (pages 207-208 and Plate V). The creatures haunt dark crevices and are fascinating to hunt. When a crayfish is spotted usually with a water glass, the grains or spear is brought down to within a foot or two of the quarry before striking. If no refuge is handy, the gamy knight usually rears back and gesticulates fiercely with his appendages as if to say, "I dare you to strike." Other kinds of spiny lobsters inhabit the seas of California, Australia, South Africa and Great Britain. One variety caught off Norway cannot be kept alive and must be boiled as soon as caught.

stretches of shifting sand are difficult for many of the creeping animals of shallow waters, and only those survive that are particularly adapted to such conditions.

The inlets and sheltered waters of Long Island, with their bottoms of mixed mud and sand, harbor an abundant fauna of their own. But south of New York, the long barren stretch of the New Jersey sand beaches interposes another barrier. These

the Gulf Stream with its masses of floating plankton is close to the edge of the narrow oceanic shelf, while its tropical influence gives a southern tinge to the shore fauna.

South of Cape Hatteras, barren conditions once more prevail, and shore species are comparatively sparse, while the seabottom is scoured of its deeper life by the swift current of the Gulf Stream.

are so predominantly siliceous that they support but few species of shallow water marine animals and effectively prevent the spread of others in both directions.

Hence, we enter another zone of distribution as we trend southward toward Cape Hatteras. The coast is once more characterized by sunken valleys like that of the Gulf of Maine, but not so extensive as Delaware and Chesapeake Bays, Albemarle and Pamlico Sounds, shelter numerous coastal species, but the range of shallow water life off shore is limited by the rapidly narrowing continental shelf as compared with the wide banks northeast of New York, opposite the Gulf of Maine.

Off Cape Hatteras, the open water fauna is abundant near the shore. Here

But southern Florida presents a striking contrast, with its tropical climate and extensive continental shelf. This submarine platform, though cut by the Gulf Stream in the Straits of Florida, nevertheless reaches far eastward to include the Bahama Islands. Here we pass into the West Indian world, with its hosts of tropical marine species.

WRAITHS ON THE BARREN SANDS

To emphasize the contrast between the barren shore just south of New York and the teeming life of the tropical Florida shallows, let us visit a part of the southern New Jersey coast toward dusk.

A sandy beach extends into the distance until its continuation is hidden by the curve of the shore. It is bounded inland by the sand dunes, their snowy sides diversified by beach grass and stunted vegetation. Long lines of beach wrack brought in by the tides parallel the water's edge. The sands seem empty of life and movement except for the wash of the sea.

But not quite!

There is a shadowy stir by the dead sea weeds—and another like a fleeting wraith farther up the sands. We blink our eyes for it has vanished. Now there is a start directly in front of us and a ghostlike creature materializes before our very eyes, only to disappear apparently into thin air. We focus our gaze more carefully and at the next sign of movement follow it eagerly.

Now, at last we identify a swift, silently moving form, a set of scampering legs and a pair of shining black eyes erected on upright stalks. We have stumbled on a community of ghost crabs (*Ocypode albicans*) and well do they deserve their name (Plate I).

Their pale, yellowish gray carapaces match the beach so exactly that when they are stationary it is almost impossible to see them. They are betrayed only by their swift movements as they glide over to the beach wrack to snatch a sand hopper or two and quickly dart back to their homes when alarmed.

Their abodes are burrows dug deep into the sand above the high tide line. The entrance is a round hole flanked by a sand heap where they stand guard or retreat until only partly visible in their doorways.

If we approach they vanish inside in a twinkling. It is almost impossible to catch them, so fleet are their movements.

We secure a few specimens only by flinging a hand net over them from a distance as they dart across the beach.

If cut off from their homes, they will take refuge in the sea, but it is apparent that they do not enjoy a watery environment, for at the first opportunity they dart out and make for their burrows.

They seem veritable creatures of the sand, being adapted to it by their concealing coloration, burrowing habits, agility, and speed, as well as by their custom of feeding upon the small crustaceans living in the jetsam of the sea.

But even these dwellers on the barren beach are invaders from the south, for this is the northern limit of their range. There are a few doubtful records of their having reached Long Island, and their free-swimming larvae often have been found as far east as Block Island and Martha's Vineyard.

Apparently the cold winters prevent the adults from becoming established north of New Jersey. To the south they range with increasing abundance to Florida and the West Indies, while on our New Jersey beach they have merely established their venture some outposts.

WHERE LIFE IS LUSH AND TEEMING

Contrast this bleak barrenness with the balmy and prolific region from which they have migrated to the South. It is, of course, a sea abounding in coral reefs, with an amazing undersea life. But since these remarkable structures have been described at length in a previous article,* we shall speak rather of the interesting creatures of the quiet lagoons enclosed between the reefs and the shore, as well as of those that have invaded the low lying beaches and the extensive shallow mangrove swamps that abound here.

The coral lagoon is the area of quiet water protected from the open sea by coral barriers and lying between them and some near by coast. The lagoon floor consists of coarse, white calcareous sand derived from materials washed in through the reefs by the tides and currents. Isolated clumps and shoals of living corals rise here and there toward the surface and small islands or cays of eroded aeolian limestone diversify the prospect.

* See 'Coral Castle Builders of Tropical Seas' by Roy Waldo Miner in the NATIONAL GEOGRAPHIC MAGAZINE, June 1934.



Photograph by Roy Waldo Miner

A SCIENTIST EXPLORES A MANGROVE SWAMP IN SOUTH BIGHT, ANDROS ISLAND

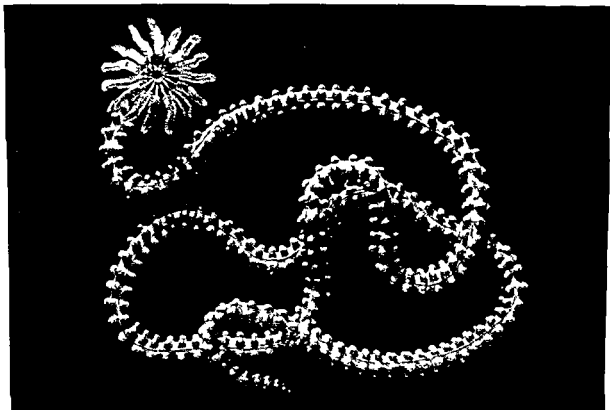
With an outboard motor, he works in and out of the coves to rake from the muddy ooze shells, worms, and other forms of burrowing life. Lime impregnates the water on the west side of this Bahama island, forming the hard crust visible on the mangrove roots beyond the boat.



Photograph by Sande

NIMBLE FINGERS QUICKLY TRIM THIS ODORIFEROUS MOUNTAIN OF SPONGES

After a boat docks at Nassau in the Bahamas, its cargo is spread under a shed along the water front, and dealers purchase the sponges at auction by the "lot" or boatload. Buyers cart them to huge yards, where they are trimmed and sorted by women. Odds and ends become fertilizer or packing material, and finished sponges are shipped out in large bales (page 219).



Photograph by R. E. Dahlgren

LIKE A PEARLY NECKLACE SEEMS THIS MODEL OF A THREE FOOT DENIZEN
OF ANDROS ISLAND

Knobs on the body of the giant *Synapta* a genus of holothurians or sea cucumbers are soft and pliable and aid the animal in creeping. Highly sensitive petal like tentacles or feelers on the head locate and entangle food particles. The creature is related to the sea stars and sea urchins but not to the eel.

The sea is very transparent and on quiet days the boat seems to be floating in air while the sandy bottom with its denizens shows with the utmost clearness.

Huge sea stars (*Oreaster reticulatus*) slowly crawl about looking for mollusks (Plate IV). They vary in color from red to blue or purple and are marked with an intricate network of raised ridges forming a pattern of triangles decorated with small knobs. They are the largest of the West Indian sea stars.

Conchs of two species are especially abundant. One the queen conch (*Strombus gigas*) is the largest sea snail found in American waters some specimens growing to a foot or more in length (Plate IV).

The thick shell has a coiled spire nearly obscured by the flange of the broadly flaring lip its lining a brilliant rosy pink.

When the creature is alive the narrow foot of the thick skinned muscular body projects from the aperture armed with a horny hooklike spine. By means of this the conch pulls itself actively about on the sea floor, digging it into the sand and

moving in irregular hops and jumps causing the heavy shell to rock from side to side in its haste to escape pursuers. It is a scavenger its food consisting of dead and decaying animal life.

One of the occupations of the Bahaman negroes is diving conchs. As our launch lies anchored in a lagoon at Andros Island we see the homemade sailboats of the natives drifting about slowly while the occupants scan the bottom through a water glass.

Suddenly there is a splash as a negro dives overboard. Soon reappearing his dripping body gleaming like polished mahogany he brands up a conch over the gunwale then drops back to get another (page 198).

Sometimes conchs are baited with meat the odor of which attracts them in large numbers and thus more may be caught in a short time by diving.

Conchs form an important article of food for the native islanders. In fact they themselves are often termed conchs to distinguish them from persons not born in the islands.

Conch shells are sold for ornamental purposes and are familiar everywhere, especially in country districts in the United States, as parlor ornaments, doorsteps, and borders for garden walks. They often secrete "conch pearls" of a beautiful rose color, which are mounted as jewelry and have a moderate value. The shells, with the tips of their spires sawed off, are sometimes used as dinner horns by natives.

CONCH SHELLS FOR CAMEOS

The helmet shell (*Cassidulinidina madagascariensis*) is another conch common in the West Indies and often associated with the queen conch on sandy lagoon bottoms. It almost equals the latter in size (Plate IV).

This huge snail creeps about on a flat foot, searching for the bivalve mollusks on which it feeds.

The shell is indeed shaped like a white helmet, with a broad, flat, cream-colored lip, blotched and striped with a deep chocolate brown. It is quite thick and of fine texture, composed of layers of white shell over the deep brown.

Since about 1820 it has been exported to Italy and France for making cameos, and has practically superseded the more expensive semiprecious stones formerly used for that purpose. Beautifully delicate carvings are made, standing out in white bas-relief against the brown background. Rome, Genoa and Paris are the most noted centers for cameo cutting.

The queen conch is also used for this purpose, but not so extensively. Cameos made from it show a rose-colored carving against a white background, but as the rose tends to fade upon too great exposure to light, eventually these cameos lose much of their contrast, and those made from the helmet shell are more highly favored (page 201).

SPINY LOBSTERS LURK IN CREVICES

Here and there rocky shoals and coral clumps rise from the sandy floor of the lagoon. The crevices and holes with which they abound are the haunts of the spiny lobsters (*Panulirus argus*).

These weird creatures are about the size of the northern lobster, but lack the large pincer claws. However, they are so completely equipped with hooklike spines that it is difficult to handle a living animal without suffering injuries (Plate V).

Brightly banded, striped, and spotted with brown, black, green, and cream color,

they are conspicuous objects when caught in the hand net. Habitually, however, they avoid the light and hide in their dens during the day. Toward evening they come out, and then it is possible to capture them more readily (pages 202 and 204).

Like the northern lobster, they move about the sea bottom on the tips of their claws, or swim rapidly with oarlike motions of the swimmerets beneath the abdomen. They attain their greatest speed in retreating from enemies by vigorous flexion of the terminal joints of the abdomen, which drives them swiftly backward after the manner of the common lobster.

Their armored bodies are covered with hairs sensitive to the slightest touch, and they have a keen sense of smell by which they can readily detect the presence of food animals even at a considerable distance. They feed upon small bottom creatures such as shrimp, mollusks, and worms.

Many enemies attack them, and they especially fall prey to the larger reef fishes such as the grouper and jewfish. One authority states that sixteen large lobsters were found in the stomach of a 350-pound jewfish.

Spiny lobsters are very important in the markets of Florida and the West Indies, the tail furnishing a meat of delicious flavor.

MANGROVE SWAMPS RICH IN LIFE

The low lying keys and reefs off the Florida coast, as well as the numerous inlets connected with the open sea, are bordered with areas of shallow water, where, in sheltered places, extensive mangrove swamps occur. These remarkable plants grow here with great luxuriance, their branches covered with thick, glossy leaves interlacing to form continuous thickets. Their slender trunks are braced by buttress-like aerial roots spreading out on all sides and firmly embedded in the calcareous mud (p. 203).

The warm, shallow waters are rich with life of all sorts.

Extensive beds of coon oysters (*Ostrea frons*) project from the white mud at low water, and even grow up on the aerial roots of the mangroves hanging in bunches like a strange sort of fruit, so that they are often spoken of as the 'oysters that grow on trees' (Plate VI).

The crown melongena (*Melongena corona*), a handsome whelk about the size of a pear, preys upon them avidly. They are very sweet and, though the meat is smaller



Photograph by Roy Waldo Miller

A SHILLING APIECE FOR YOUR HELMET SHELLS!

The cost of a good one is a matter of bargaining and of the natives' whim. A shilling is a good price, though a sixpence (about 12 cents) may sometimes be accepted if the seller has a large number to market. Natives of the Bahama Islands are locally called "conchs."

than that of the Virginia oysters, it is nevertheless well worth the trouble of extracting for food.

These oysters are abundant from Florida and the West Indies to North Carolina and throughout the coast of the Southern States; are much sought after by raccoons; hence their popular name.

The spotted cowry (*Cypraea exanthema*) is very abundant here. Its polished chestnut and bluish white shells decorated with round white spots cling to the stems of the mangroves. When submerged the voluminous and conspicuously colored folds of its mantle emerge from the shell opening on both sides and slide up symmetrically, nearly covering its smooth surface to the middle line and laying down a thin glossy layer of porcelain as they do so.

Brightly colored mangrove crabs (*Goni-*

opsis cruentata) their square carapaces aglow with scarlet marked with brilliant yellow and blue scamper over the oyster beds. Here and there in the shallow pools are seen the more soberly attired mud crabs (*Panopeus herbstii*), recognizable by the black fingers of their claws and the arched, saw-toothed margin of the carapace.

Leaving the swamp we round a rocky point where among the cavities and pinacles of the honeycomb limestone rock hundreds of small snails cling to the rough stone awash or between the tidemarks.

Three species having strongly arched shells are abundant, belonging to the genus *Vermetus*. The smallest, about one half inch in diameter, is finely marked with a black and white checkerboard pattern (*Vermetus tessellata*); another somewhat larger (*Vermetus versicolor*), is distinguished by close set

rounded ridges gaily decorated with red black and white squares and blotches the third (*Verita pteronota*) is the well known 'bleeding tooth'. Turning it over we find that the mouth opening bears two flat teeth on its white inner margin one or both of which are blotched with yellowish red resembling a bloody stain.

The zigzag periwinkle (*Isturgia zigzag*) is also found here its cone shaped spire marked by fine zigzag lines of brownish yellow.

Large chitons cling tightly in the hollows near the water line their oval bodies protected by an armor of jointed plates bordered with a zone of feltlike spines.

Tropical rock crabs the Sally Light foot (*Grapsus grapsus*) swiftly scamper over the rocks in all directions especially where they are drenched by salt spray. These creatures are found everywhere in the Tropics in similar situations. Their thin squarish carapaces are brightly marked by yellow and red lines and long flat jointed legs bear them agilely over the rocks with such speed that it is very difficult to capture them.

LAND CRABS SCUTTLE ABOUT AT DUSK

We step off the outcropping of rock onto a white beach of calcareous sand. Thickets of sea grape grow along its upper margin under the coconut palms diversified with low flat clumps of beach lavender the pale green leaf clusters of which are covered with a whitish bloom like dusty miller.

Even here animal life is abundant. Large land crabs of two species—the red mountain crab (*Gecarcinus ruricola*) purplish red with pale yellow markings and the great white land crab (*Cardisoma guianense*) with shell of bluish gray to yellowish white—dig extensive burrows in the sand with their powerful claws (Plate VII).

These huge crabs scuttle about awkwardly but with considerable speed. They come out in large numbers at dusk and if we are walking along the beach in the darkness they are likely to come bumping against our legs. Both species dig their homes not only near the shore but also on the low wooded hills.

Each year they migrate to the sea in immense armies. There the females enter the surf to wash off the eggs clinging to the underside of their abdomens and thus allow them to hatch. Then the adults return to their abodes in the hills to be followed

about two weeks later by the migration of their newly hatched young.

Red mountain crabs have a delicious flavor when boiled stewed, or baked in the shell.

The land hermit crabs (*Cocnobia diogenes*) run along the beach foraging among the dead leaves and the prostrate decaying trunks of fallen coconut palms. Their spiny pincer claws are brightly colored red and blue and like our northern hermits when disturbed they quickly withdraw into their shells blocking the entrance with expanded pincers.

They utilize empty mollusk shells for homes and when they outgrow them promptly investigate all new possibilities alternately trying various shells and popping back into the old one for comparison. Finally they select the most comfortable abode though they may walk off with the original shell after all.

Apparently they are willing to try anything that at all resembles a shell for one of our expeditions from the American Museum discovered a hermit crab on a Bahama beach that had adopted the bowl of an old clay pipe for its abode! This specimen pipe and all is now on exhibition in the Museum (Plate VII).

Coral reefs and sand bars are typical of the eastern or windward side of the Florida coast and the Bahama Islands. On the westward or sheltered side of the larger bodies of land coral reefs are practically nonexistent and the sea is floored with a very soft calcareous mud.

This is true especially of the Great Bahama Bank between the Straits of Florida and Andros Island. A curious spreading seaweed known as old man's beard grows over the muddy bottom and here and there are outcrops and ledges of old limestone rock. These are the great sponge banks. Here and on the Gulf coast of Florida most of the commercial sponges of American waters are harvested for the market.

Many species of sponges cannot be used commercially because of the glassy spicules or needles embedded in their tissues. This is universally true of the northern sponges and there are many species in the Tropics as well that belong to this category.

Several of the latter are shown in Color Plate VIII. The spiny tube sponge (*Spinosella saroria*) grows in clusters of trumpet shaped chimneys of papery texture too hard and resistant for commercial use even

STRANGE CREATURES OF SUNNY SEAS

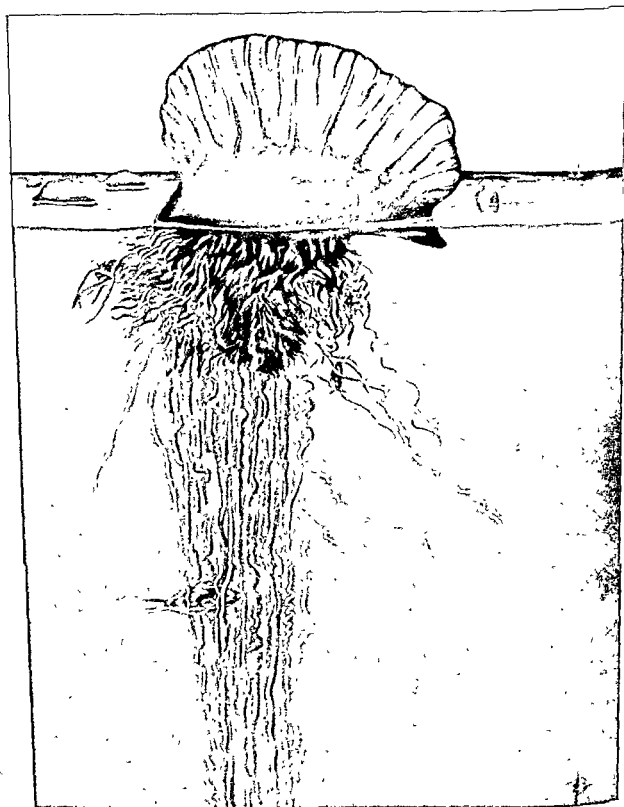


© National Geographic Society

Painted by Else Bostelmann under direction Roy W. Mimer

GHOST CRABS SCUTTLE ACROSS THE BEACH TO SNATCH A MEAL OF SAND HOPPERS

When motionless, these yellowish wraiths, with black, glistening eyes mounted on stalks, blend with the sand. In the faint light of dusk, the yellow carapaces seem of lighter color when viewed from a distance. A seemingly pale GHOST CRAB (upper right) rests beside a burrow, its refuge in times of danger. These creatures are very active and hard to catch. New Jersey marks their northern limit, and they become increasingly abundant southward along the Atlantic coast. The empty shells of the SAND COLLAR SNAIL (lower left) and the large CHanneled whELK (left center) were cast up by waves. Edges of dead scallop shells protrude from the sand in the lower right corner.



© National Geographic Society

Painted by Else Hostelmann under direction Roy W. Miner

A FAIRY FRIGATE DRIFTS NORTHWARD ON THE GULF STREAM

Dealing death to tiny tropic dwellers, the PORTUGUESE MAN-OF-WAR seems an iridescent, bubble-like craft. Actually, it is a colony of cooperative polyps, each with a special function. The "sail," or crested bladder of the mother unit, contains gas that keeps the craft afloat. Green polyps feel and taste, blue ones absorb food, and the pink are reproductive organs. The long streamers bear batteries of nettle cells so powerful that shipwrecked sailors stung by them have been known to die. The tentacles paralyze fish and convey them to the "mouths." Curiously, the PORTUGUESE MAN-OF-WAR first (lower) lives unharmed among the streamers, probably acting as a lure and sharing the prey.



© National Geographic Society

Painted by Elie Boschmann under direction of Roy W. M. ner

SEA NETTLES AND SOME COUSINS THAT LURK IN DEEP BLUE WATERS

Graceful and rose-flecked, the PELAGIA (upper right) propels itself by expanding and contracting the umbrella. Slender tentacles armed with stinging cells fringe from the border to entangle the prey. Vast swarms of the MUSKHOON JELLYFISH (lower left) sometimes carpet the ocean in patches 100 miles long. The animal has no mouth and uses instead curious mouth lobes equipped with suckers. The CUBOID MEDUSA (upper left) swims in the open sea. Two species of comb jellies are shown: the ribbon-like VENUS'S GIRDLE (lower right) which rolls and unrolls as it swims, and the delicate ROSEBELLY (left center).



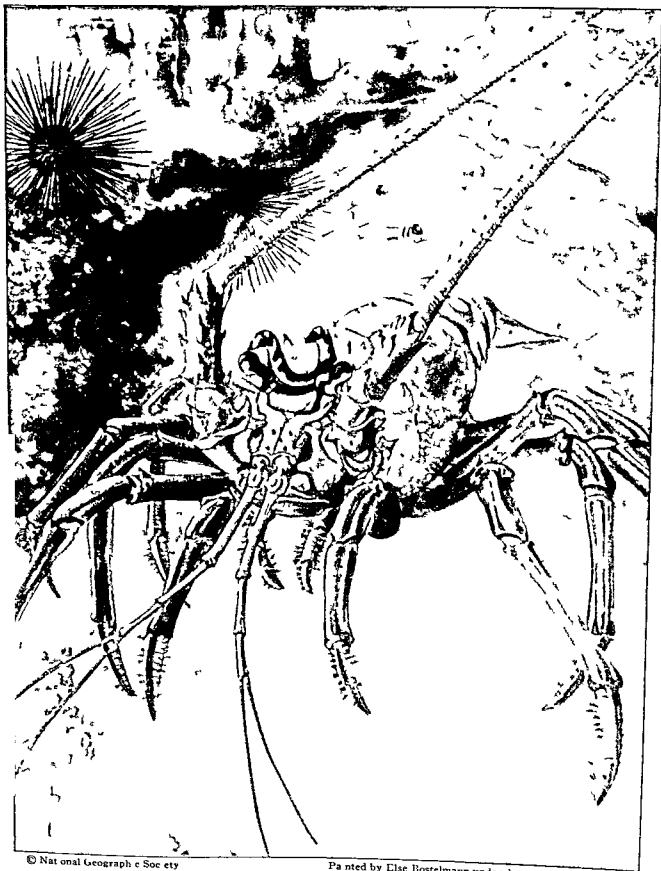
© National Geographic Society

Illustrated by Elsie L. Elmann under direction of Roy W. Mearns

QUEEN CONCH LARGEST OF AMERICAN SHELLS MAY END UP AS A DINNER HORN

These giant sea snails, once resting on its side above a length of a foot or more. The meat makes fine chowder, but fishermen cut it up for bait. If alarmed, the queen conch jumps jerkily along the sea floor, rocking from side to side. Cameo cutters in Italy and France import large numbers of the CAMBODIAN HELMET SHELL (lower left). Between two purple tentacles protrudes the mouth tube which sheathes a band or tongue set with tiny file-like teeth that grind up fleshy food and drill holes in the shells of prey. A GREAT SEA STAR (right) crawls on the white sand. Clinging to the Gorgonian or sea bush (left) are a VOLLEY EGG SHELL (lower) and three SINGLE EGG SHELLS (above).

STRANGE CREATURES OF SUNNY SEAS



© National Geographic Society

Painted by Else Bostelmann under direction of Roy W. M. ner

GRAB THIS GAMY ARMORED KNIGHT AT YOUR PERIL!

Although the SPINY LOBSTER, or CRAYFISH, of Florida and the West Indies has no pincer claws as does its northern cousin, long lanceolate antennae and sharp spines help protect it against enemies. During the day this brightly banded creature lurks in crevices, but at night it wanders about in search of food, pointed tips of slender legs barely touching the bottom. Its jointed tail contains delicious meat. Needlelike spines of the SEA URCHIN (upper left) seldom stop waving back and forth on ball and socket joints. When the pointers pierce a bather's leg, they break off, work inward, and cause festering sores. Red striped SQUIRREL FISH swim above the crayfish, and red FIRE SPONGES brood nearby.



Copyright 1911 by National Geographic Society

Illustration by Howard Chandler Christy

OYSTERS CLOW O' TREES IN SOUTHERN MANGROVE SWAMPS

Named for the raccoons that rely on them, COASTAL CLAWERS are the most common of the mangrove crabs. Turning over the oysters in search of worms and small fish is a habit of the crab with long jointed legs and strong claws. When a crab is found, the oyster is pulled out from its hole in its pear-shaped shell. The crab then eats the oyster with its long legs and claws. The crab is a common sight in the mangrove swamps.



© National Geographic Society

Illustrated by Else Hostelmann under direction of Roy W. Miner

LAND CRABS MAKE ANNUAL PILGRIMAGES TO THE SEA

Marching in vast armies, the black or blue MOUNTAIN CRAB (upper right) and the WHITE (lower left) of the Bahamas and southern Florida swarm down to the water each May to spawn. No obstacle seems to deter them; they have been known to crawl through and over houses that stood in their line of march. Eggs hatch in the sea, and soon a young army follows the parental horde landward. The LAND HIKING CRAB also abundant in the Tropics utilizes shells and even broken clay pipes to protect its soft abdomen. One specimen is now in the American Museum of Natural History in New York.



© National Geographic Society

Painted by Elise Hostelmann under direction Roy W. Steer

MANY SPONGES OF FLORIDA AND THE BAHAMAS GROW TO STARTLING SIZE AND SHAPE.

When alive, the commercial sponge (right) is usually dark, even coal black. From the one pictured, a sponge crab has cut a slice with its sharp claws to serve as an overcoat—camouflage. Many tropical sponges, like relatives in northern waters, have no commercial value because of glassy needles or ledges in their tissues. Among these are the **STING TUBE** (upper), the **RED BRANCH**, and the **GRAY AND GREEN ENCRUSTING FORMS** in the foreground. Brilliant red **FIKE SPONGES** grow over dead coral. The **HYPERICUM CORAL** overgrows a dead sea bush. Its whitish filaments sting if they touch human skin.

were it not for the spicules. The shorter yellow siphons of the tube sponge (*Tulalullata*), though of much finer and more delicate mesh are also unsuited for this purpose.

Some sponges like the red branched sponge (*Pachychalina rubens*) grow in colonies made up of long branching fingers with conspicuous oval oscula scattered at intervals over the sides. Brilliantly colored encrusting sponges like the scarlet fire sponge (*Tedania ignis*) and the soft mat like layers of various blue and green species enliven the surface of dead coral rock with bright patches of color.

The true commercial sponges however when alive probably never would be recognized by one not familiar with them in this condition. They are of very somber colors from yellowish gray through various shades of brown to coal black. In fact some of the finest and most valuable varieties resemble masses of coal black leather or rubber rather than anything else.

HOW A SPONGE CRAB HIDES

Most of them belong to two main genera *Euspongia* and *Hippospongia*. *Euspongia officinalis* is shown in Color Plate VIII.

A sponge crab (*Dromidia antillensis*) has cut off a piece of the sponge and is holding it over its back by means of its hind claws. The crab then neatly subsides into the hollow of the sponge from which the piece was cut as if under a trap door and is immediately and protectively concealed by this bit of camouflage!

The commercial sponge as seen in the market is merely the skeletal network by which the gelatinous animal tissues of the sponge are supported and held in shape. Of silken texture it is composed of a fibrous somewhat elastic substance known as spongin.

The best commercial sponges have compressibility and resiliency to the highest degree and also the added features of velvet softness and freedom from accumulated particles of hard foreign matter. The best sponges are also durable and evenly rounded or oval in shape.

When alive the skeleton is embedded in a living tissue which has much the consistency of liver. Some sponges are massive others cup shaped while still others are welded clusters of fingerlike tubes.

The finest commercial sponges are those of the Mediterranean but certain varieties

fished on the Bahama and Florida banks are of excellent quality. The best American sponges are the sheep wool velvet and Florida yellow. Fleets of sponging schooners carry the fishermen out to the banks and the sponges are secured by diving or hooking. (page 198)

HOOING FOR SPONGES

The latter method used universally on the Bahama banks consists of spotting the sponges through a water glass then lowering a long handled hook with two or three prongs to dislodge the sponge. The boats are filled with them and as much of the animal material as possible is beaten off against the gunwales of the boat with wooden bats. The sponges are then allowed to decay in the sun and more of the ill smelling soft tissue is beaten away.

They are then heaped in crawls wicker enclosures built in the edge of the water near the shore. The macerating process is advanced and cleansing completed by more beating and rinsing.

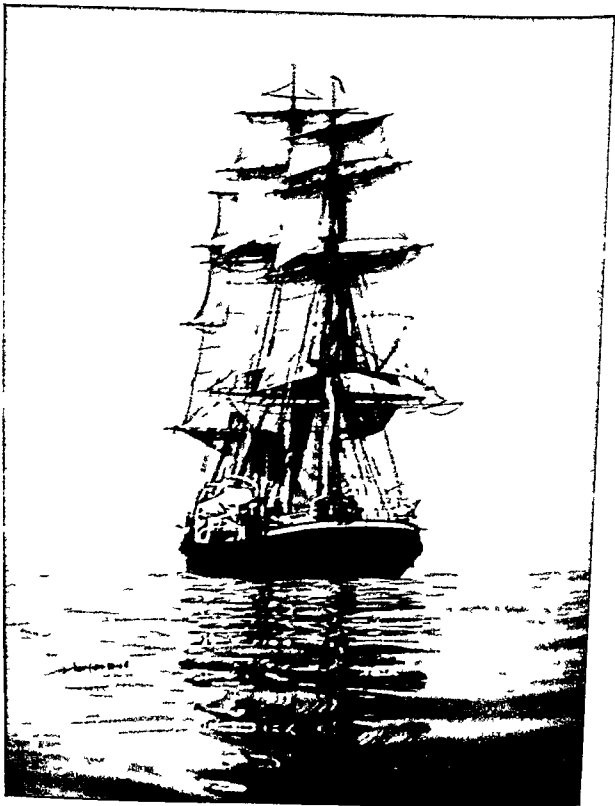
The catch is dried aboard the boat while returning to the sponge market where it is sorted and spread out in long sheds to be auctioned off to sponge merchants. It is then taken to sponge houses to be shaped, trimmed and sorted for market. (p. 206)

FITTEST AND FIERCEST SURVIVE

These are only a few examples of the multitudinous forms of life that swarm in the shallow waters along the ocean margin.

In the more southern waters genial temperatures the year round allow continuous development of myriad creatures not adapted to northern seas while an abundance of lime producing organisms makes possible the construction of skeletal substances and protective shells to a degree not attainable elsewhere. So coral reefs abound and the shell building mollusks have reached an unusual degree of development.

Nevertheless the same fundamental principle of interdependent relationship of all life remains. Conditions of temperature, essential chemical elements and sunlight determine the abundance of plant life whether microscopic or of larger growth. This basic submarine pasturage feeds hosts of the smaller animals which in turn are fed upon by larger forms in obedience to the sea's inexorable law that the strong shall prey on the weak and the fittest shall survive.



FOR DAYS THE JOSEPH CONRAD DRIFTED ON A PAINTED SEA NOT A TRIATH OF AIR
BELLERING HER CLASSY REFLECTIO

Once in the Celebes Sea she floated in one spot so long that garls and tin cans lay stagnant in the water and rose five ways until the sight grew oppressive and we felt at them to sink them (page 2). Or, na, with the vessel was built as the Danish school ship *Georg Stage* in Copenhagen in 1851. Described as a frigate with single masts, topsail and royals on all three masts she was intended to be a 20-bo' sloop in 1851, and for 18 years sailed in this work in Baltic waters where she was a favorite sight. She had never been to the North Sea until Mr. A. was taken for a punishment.

NORTH ABOUT

BY ALAN J. VILLIERS

AUTHOR OF *CAPT. HENRY CROFT'S RACE*, *THE SOUTHERN HORN IN A W. J. JAMMER*, AND *WHERE THE SAILING SHIP SERVED* IN THE NATIONAL GEOGRAPHIC MAGAZINE

With Illustrations from Photographs by the Author

FROM Singapore there are two routes by which a square rigged ship may hope to reach Sydney New South Wales. Either she may make the best of her way to the southward through Soenda (Sunda) Strait or around the north of Sumatra with the southeast monsoon standing down the west coast of Australia and then running her longitude down in the wild west winds to the south of that continent or she may go northward around Borneo and eastward into the Pacific hoping that when that difficult stage of the voyage is past she may make her southing with the southeast trade.*

The Admiralty Sailing Directions a large, concise volume with information on how to take a sailing ship from anywhere on earth to anywhere else warn that the northern passage ought not to be attempted at the time of the year I had to set out but it was the most interesting way and I took it.

The dawn of the first of August found me under all sail outside the Strait of Singapore, headed across the China Sea toward the coast of Borneo and from there to Balabac and the Sulu Sea, through there to Tawitawi and the Celebes Sea, and southward of Mindanao into the Pacific.

After that, I did not know, but I planned to make what way I could in the general direction of the Solomon Islands.

At first we made good speed but then the wind fell light and we sailed along upright and silent in the China Sea with never a ship in sight, the coast of Borneo low and unseen and the green blue sea littered with logs and trees and forest jetsam, round which sea snakes swam.

Then we had squalls, and waterspouts—I gave them a good berth—and stifling calm.

In a week the heights of Balabac Island loomed ahead and we had before us the waters of the Sulu Sea. I stood on care

fully toward the land (for Balabac there is surrounded by reefs) and toward nightfall noticed a large steamer ahead, curiously still and unhurt.

What could she be? A derelict? Or a wreck?

We sailed closer, and at evening with the clouds heavy over Borneo anchored for the night close by the stranger on a reef with twenty fathoms of water. There was little wind then we were better with a kedge down for the night in those waters.

BOARDING A DERELICT

At daylight I rowed over to the steamer to find her the gutted hull of a Japanese tramp. She was a long old vessel narrow and deep with every hold full of water and the after well deck all slime where every rising tide had washed and big crabs scuttling at our approach. Even in the dim light of breaking day one could see the reef on which the steamer stood almost upright.

Here and there her steel decks were rotted and the shapes of queer big fish shimmered in the darkened water in the holds. She was full of weird, sad noises, like a lonely beach with a quiet sea breaking and a moaning rising wind (page 222).

Poor ship! Everything of value had been stripped from her long since but I was not interested in her fittings. We fished in the holds swam in one of them then left her ruminating on the futility of ships without water under them and the finality of getting upon a Sulu reef.

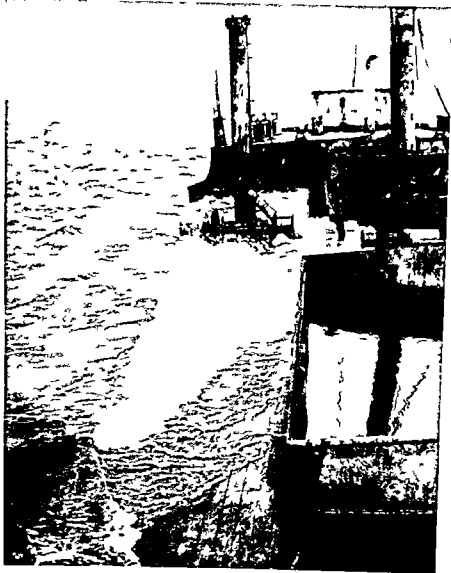
We hoisted up the kedge and sailed on through Balabac Strait. At nightfall off Dalawan Bay the wind drew ahead so that I could not go on. I stood in for the entrance of the narrow bay and anchored.

In the morning arrived a stout and somewhat greasy master of a motor vessel from Manila who came in twice a year to load wood but seeing us he forgot about the wood. He came alongside shouting: Were we in distress? No we were not in distress I replied.

There was no salvage. I saw the bleak disappointment on his florid face.

Then had we permission to visit the

* See The Society's New Map of the Pacific published as a supplement to the December 1916 issue of THE NATIONAL GEOGRAPHIC MAGAZINE and the accompanying article about the map by Gilbert Grosvenor.



FISH SWIMMING IN WATER FILLED HOLDS ARE NOW THE
KOWA MARU'S ONLY CARGO

Sailing in the Sulu Sea past the reefs of Balabac Island the lookout of the *Joseph Conrad* spotted a big ship strangely still and somber. On approaching closer and putting off a boat it was discovered that the hulk was the wreck of an old Japanese steamer perched precariously on a submerged reef. Seas swept over the afterdeck and the dark forms of fish could be seen swimming inside of her. Bits of coal still remained. The derelict had been stripped of all loose gear and apparently had been abandoned to the sea. (page 271)

Philippines? Were we cleared inwards from a port of entry? We were not, I said. Nor were we visiting the Philippines; we were anchored outside Davao Bay waiting for a fair wind.

But the greasy one seemed not to realize we were a sailing ship. We were inside the territorial limits (there wasn't any anchorage outside) and we were therefore a highly suspicious vessel, probably piratical and certainly, at the very least, smuggling

He was desolated at the thought of causing trouble to gentlemen of his own calling but he felt it was his duty to summon a gunboat from Manila.

To this I replied that I would cordially receive any number of gunboats and ships of war of any description and had no doubt they would have pleasant steaming but their visit could hardly be justified.

He got busy on his wireless to Manila urgently imploring I gather, the dispatch of six cruisers.

Then he went in for his timber and I went ashore. But there was nothing but a small stream and a tiny village and in a clearing three natives building a hut.

One spoke English of a kind that he said he had learned at an American school in Balabac; the others spoke

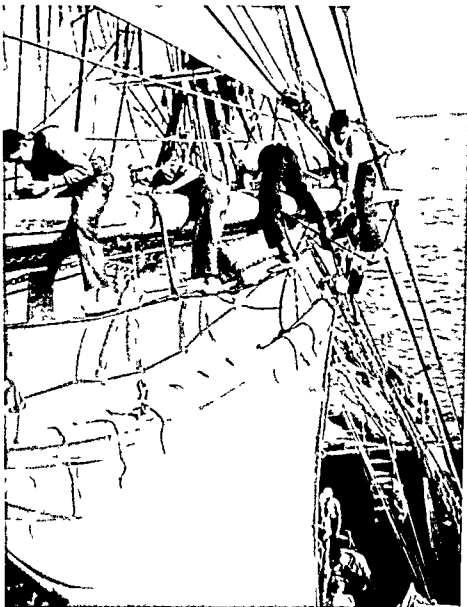
Spanish with even more indifference. They looked fierce and were attired in cotton singlets bought from a Chinese store. Later we found a Manila man who had been a steward in the American Navy, on the veranda of his small house among the babes and the dogs were notices in Spanish exhorting all and sundry to vote for Somebody for President.

Late in the afternoon the greasy one departed desperately anxious for us to be a

piratical vessel of some kind in order that he might have the honor—and reward—of first finding us. But his gunboats did not come, and now he was hurrying off to a larger port from which to summon armed constabulary.

At midnight the wind sprang up, light and fair, I hove up my anchor and departed.

From Dalawan Bay we were ten days making the next 200 miles, dribbling and drifting through the Sulu Sea calms with tide rips and overfalls, and with long lines of logs, coconuts, and other debris floating by, and once the half of a native fence and a tree on a small island that must have been swept in flood down some Borneo stream. But never so much as the smoke of a gunboat did we see



TAKING IN SAIL—AN EASY TASK IN LIGHT AIR WHEN SNEAKERS OR BARE FEET WILL DO

But if the wind blows and the ship rolls heavy boots with good heels are necessary to give a firm grip on the wire footrope. As the men lean forward in unison to grasp the bellying canvas the footropes swing up behind them giving them the dizzy feeling when they first try it that they will be shot head first over the yard. Here the ship sails close by the wind and the yardarms are braced inboard at a sharp angle to the keel.

We beat about, tacking and wearing ship many times each watch in the baffling airs, seldom making much progress. Once, after a particularly trying 24 hours, during which we must have put the ship round at least 15 times, the noon position showed that a contrary set had put us 20 miles backward. It was dispiriting, but the only thing was to go on, hoping for a decent breeze.

It was hot and humid, and it rained every day. There were nights when the calms were deadlier than any I had previ-

ously known. All the sky was so dead that the very twinkle had gone from the stars, and the sea was flatter than Kensington Pond and all the ship was still—not moving, not even gently lifting with that slow motion so seldom absent from the sea, all quietened, with the sails' blackened shapes hanging dead from the yards and not a block creaking.

It was a calm unnatural, foreboding, frightening. The helmsmen softly spoke the unsteered course to their somnolent reliefs,

the lookout on the fo'c'sle head stood quietly in the same place, not moving, the red and green sidelights threw long reflections in the dull water, not shimmering, the second mate on watch hung over the rail aft as if he had been built there with the ship and was as incapable of movement without wind as she was.

But in the course of time we made a little progress. We passed Cagayan Sulu, picturesque and lovely, but there was no port of entry and I did not stop.

One day we found ourselves close to an island known as Mambahenuhan—a tiny place, nothing but a precipitous brown rock with a few trees clinging to its flattened top. I put out a boat and pulled over, the weather being calm, to discover why so small a place had so long a name.

Landing on a narrow ledge of rock which ran around it, I saw tropic fish swimming in rock pools and crabs running on the summit was a fireplace, very old. Had this been used in far off days for secret rites and sacrifice? I don't know, far more likely it was used by the wandering pirates for cooking a supper of rockfish and crabs.

But all the pirates we saw were engaged in the humdrum business of carrying copra into Jolo. Yet they had fast boats, I noticed, and always came to have a look at us.

At last we came to Tawitawi and anchored beneath Bongao Peak in Chongos Bay, one of the best anchorages of the whole voyage. It was evening behind the island of coconut groves with a native village on stilts close by and Bongao Peak, bluff and wooded and worn, held up the rain clouds of the south monsoon.

I looked about for the pirates of Balimbing for whom the warning is printed on the Admiralty chart, but saw none nor port officials nor gunboats, nor visitors.

BONGAO—NO FORMS OR FORMALITY

In the morning, going into Bongao Island to report the ship's arrival, I found it a pleasant, sleepy place of palms and beaches and a native town on stilts out in the water, a rickety wharf and stone stockade, a military post and a jail, and graves in a grass plot with white men's names above them.

A wide sandy roadway, glaring in the sun leads from the ancient wharf past barracks and guardhouse and wooden jail to the commandant's quarters past a grassy square marked off the grass. From the

jail a few nondescript inhabitants looked out sadly, everywhere I saw fixed bayonets.

The commandant, a pleasant, rotund Filipino, in shorts and a pajama coat of rich blue silk, was seated on his veranda. Formalities were scant. There were no harbor dues, port dues, light dues, no pilots no ship chandlers, no shipping butchers. There was scarcely a form to be filled in. A good place, this Bongao.

I yarn with the commandant a while. Trouble? Not much, not real trouble. Now and again there is a bit of a murder. The Moros run amuck and kill someone, usually a teacher. The teachers are mostly Filipino Christians, there are more than a hundred of them scattered in 30 schools through Tawitawi and its surrounding islands.

Two had been disemboweled just before we came, on an island called Parangan, near Balimbing. Three soldiers were killed in the fight that followed the attempt to arrest the murderers. But excitement? No.

I did not see any white men about Bongao was given up entirely to the Moros and a few Bajaos (Bajaus), living in their picturesque carved boats. There were four Chinese stores and one Japanese. On the floors of the former babies played and the tails of big sharks stank to the heavens.

TRIBAL FEUDS SUPPLANT PIRATE RAIDS

And the pirates, where were they? Out of business, said the commandant, it was some years now since they had dared to raid in northern Celebes Sea (page 233).

In the old days the people of Balimbing and near by villages builders of fast and magnificent boats, were the scourges of these seas, raiding with fire and sword into Celebes and all around for slaves to sell in Borneo and Mindanao, not hesitating to attack such weaker vessels as came their way.

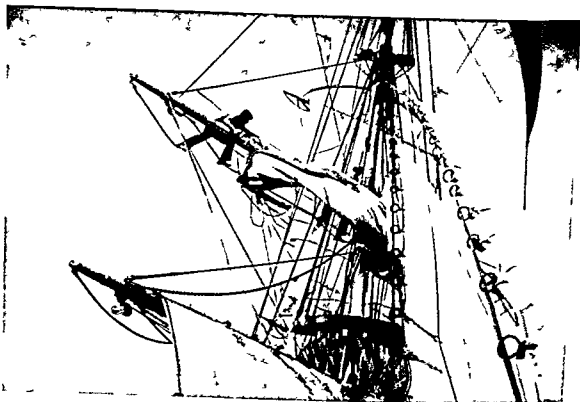
The Spaniards sent a squadron to destroy their ships and towns, but such efforts did not stop piracy for a month. The towns were, and still are, merely lines of wooden homes built up roughly on stilts over the harbors these were easy enough to destroy and easy to build again.

The fast boats, too, were easily replaced though this took time. The people of Balimbing were magnificent boatbuilders still are. I gathered though now they build for peaceful export and smuggling. They could still do a little of that, for there was



CADETS GO ALOFT OVER THE TOP TO SEND UP THE MAIN ROYAL YARD

Youngsters of the crew who intended to follow the sea as a career were taught seamanship in much the same manner as were their great grandfathers 100 years ago. Here they have been ordered aloft like monkeys in a drill to the topmost yard of the ship. The upper lad is just climbing over the top or platform that serves as a spreader for some of the complicated network of rigging which staves the masts upright. The lower boy is awaiting his turn on the ratlines or ladderlike crosspieces of the main shrouds.



TWO DAYS ARE REQUIRED TO CHANGE A SHIP'S HEAVY CANVAS TO A LIGHT SUIT

The boys much prefer changing sails to the routine cleaning and painting which must go on in periods of good weather. Here the fore topsail is being unrolled or taken off preparatory to changing.

no control of the boats going and coming to and from North Borneo.

The Balimbing people were intractable, said the commandant. Energy which formerly found outlet in pirate raids now led to intertribal fights. The people of the village near which the ship was anchored had he said come from Balimbing. I had better keep an eye on them, they were all right, but if they saw that they could get off with anything they would. Yes, even the ship.

The schoolchildren fought the women fought. Recently someone had tried to organize a school meet of all the island. It had to be stopped because the Balimbing and Malasa children seemed determined to murder all the others. A week or two after that the commandant had been compelled to arrest 39 women who had begun a battle with the girls of Simunul.

A VILLAGE ON STILTS

Balimbing village was about six miles from the ship along the shores of Tawitawi Bay. I sailed there in the lifeboat, going quickly with rain squalls through the white waters of the bay.

A group stood waiting on the rickety

pier as we came in. I saw a big knife or two and wondered if they might not still be pirates. A huge giant leered wickedly as I brought the boat alongside, but it turned out that he was the schoolteacher, and he spoke English. He straightway wanted us to inspect the kindergarten on the foreshore under the trees. I saw children playing hopscotch near their new school.

Pirates! That Admiralty chart, it seemed to me was slightly out of date.

The school was very modern with mottoes on the walls and exhortations to the young to eat fruit twice daily (they get little else), clean their teeth and see that their bowls move regularly.

The teacher was slightly pessimistic. The children, he remarked, learn little and remember less. If there is harvesting they do not bother about school and it is almost impossible to get the girls to go.

Back on the wharf a horde of grinning shipwrights were pawing over every detail of the ship's lifeboat, feeling the oiled canvas of the sails, throwing out the anchors and trying them trying the oars. It was probably the first European boat they had seen after a long and arduous examination.

they announced—so the teacher interpreted—that it was not so bad but they could do much better themselves.

A FRIENDLY CHIEF ENTERTAINS

At Chongos Bay in Tawitawi the ship lay close by Malasa village (page 229) with whose chief and people we became very friendly. The chief was a stout man who went around with a loaded Colt revolver strapped to his waist; his title was the Panglima Sarawi.

He was most interested in the ship and all on board. I entertained him to the best of my ability. But he did not want to be entertained; he seemed content merely to be on board, though he never came without a large bodyguard.

One evening he put on an exhibition of Moro dancing at his home, a spacious airy and not unbeautiful dwelling of rough wood situated in the most strategic position in the village, which is built upon piles by the sea. One crazy dangerous bridge connects the row of wooden houses with the beach, where the coconuts and crops are grown and the boats built.

They are excellent boatbuilders, these Malasa people. Their boats high ended like the old Vikings, beamy with great sheer and flare, rest in uncompleted state beneath the palms. They are often lavishly carved and their speed is surprising.

An even crazier bridge than that to the shore connects the row of houses. Naked brown children scampered about and stared and little boys baled out waterlogged canoes. Some of the elders had a piratical look, but said and did nothing except crowd in at the dance.

Inside the great room of the Panglima's dwelling (in a corner of which was a large double bed) two half-naked stalwarts banged immense metal drums resembling huge inverted cooking pots. A woman played monotonously on a row of brass xylophones.

We people from the ship sat in state and watched the dance, a weird shuffle with jerky movements of the arms done by little girls in velvets and gold. Much of the gold was strange coins long in disuse.

Afterwards came little boys who stamped dexterously in their bare heels, always to the same monotonous music they danced and danced. Then evening came and then the night and weird lights threw long shadows in the great room until the whole

took on a semblance of unreality—the gongs and the drums and the little boys and girls stamping in their velvets and gold.

A number of my cadets were present at the dance, among them 14-year-old Stormal long (pages 231 and 249). Among the dancers was the daughter of the Panglima, aged perhaps thirteen.

It appeared that the Panglima's daughter, for political reasons, was promised in marriage to an elderly gentleman living in the next village. This man though apparently possessed of considerable power (he was said to be fifth cousin to the Sultan of Sulu) was stout, scarred, cross-eyed, already much married. His favorite attire seemed to be old underpants and a white shirt collarless, the whole decorated lavishly with golden coins across his back, hung a huge jeweled kris and on his face usually sat a look of some malevolence.

A PRINCESS PROPOSES TO STORMALONG

At any rate the Panglima's daughter did not want to marry him; instead she took a liking to our Stormal long.

Nothing was said about this until just before we were to sail, when long after midnight the Panglima and a delegation of the chief men came on board to acquaint the boy with the little Princess' decision.

They came mysteriously in several large boats with two interpreters who asked for Stormal long. He was asleep as was every body else save the watchmen at that hour of the night. Well, said the Panglima, find him and round the decks he went with his delegation peering at the faces of the sleeping boys.

At length they found him, woke him and proceeded to explain their proposal. The Panglima said the interpreter wanted a white son; his daughter, the little Princess, wanted a white husband. Would he stay? The Panglima grinned encouragement.

NO WEDDING BELLS FOR STORMALONG

Stormal long, disbelieving, blinked. Was he dreaming? No, the Princess was there. She and her mother were waiting in a boat at the foot of the gangway. He could come straight away. No one need know. His life at Malasa would be a happy one. He could have all the boats he wanted and sail all day on the bay.

But as soon as Stormal long was sufficiently awake to understand that the proposition really was serious, he jumped up



A BOARDING PARTY OF MELANESIANS IN FRAIL OUTRIGGERS STORMS THE CONRAD

Put nowadays they come bringing pigs fowls coconuts yams oranges and limes instead of spears and arrows as in former days. They will exchange the produce for heavy black "stick" tobacco so dear to all South Sea islanders. Clearly shown here is the manner of setting up outboard the *Conrad's* standing rigging which stays the masts (page 240)

brusquely refused ran down into the hold and hid himself. It was several hours later before the watchmen could induce the disappointed delegation to leave.

"I reckon it's an insult!" shouted the boy next morning appalled at the idea that white blood should join with brown but he really was scared considering the whole thing a plot to cajole him ashore and eat him. But Hardcase and the other boys did not share this view and for days lamented that the little Princess had not shown the good sense to choose one of them selves instead of bashful Stormalong.

Not long before sailing from Tawitawi I discovered that on Bongao Peak was the historic Tree of Life for which the old explorers often searched. It is they told me an exceptionally large and beautiful palm the foliage of which changes daily. If you eat of its leaves you will grow old but you will not die.

Since the tree is in an utterly inaccessible place no one knows whether the legend is truth or not so the tree may safely be worshipped. It is I gathered still worshipped though not as much as

formerly. With the advent of schools the Moro worshipers less believes less works less.

One day sailing in the lifeboat through the long inlet that divides Sanga Sanga Island from Tawitawi we came across the plantation of a white man gone native. Lean, tanned bearded barefooted and leathery skinned attired in ancient garments surmounted by a floppy native hat with a large wife and numerous progeny, he looks the part.

But the children are not his and his wife is neither young nor particularly attractive possessing instead the finer attributes of being hard working and soft spoken. And the white man instead of looting at his ease in the lotus-eating land works very hard upon a large plantation which he has himself hacked from the bewildering strewn pine infested Tawitawi bush.

"Come on in strangers!" he shouted to us as we crossed his clearing after miles of moist windless heat belching path. Sleek dogs moved over to make room and some well-groomed Filipino children scurried away dragging a fat testing monkey.

The white man, we gathered had been



JOSEPH CONRAD LAY TO CLOSE BY MALASA, A PHILIPPINE VILLAGE ON STILTS

A rickety bridge the only main street connects the thatch roofed houses with the rock foreshore. Beside every home the owner's canoe his only mode of transportation was parked by the piers.

there since 1907. Like it? No, he didn't like it. It had grown around him. It was kind of home now. There wasn't any other place where he meant anything.

He did not ordinarily get much news except for such scraps as could be read in ancient copies of the *San Francisco Examiner* used by the Chinese storekeeper in Bongao to wrap up his few purchases.

In the late afternoon he saw us back to our boat plodding barefoot through his rough, fetid fields. Here and there the heat belched from the hot earth as if a furnace door had just been opened. We passed coconut groves (the lazy man's crop, he said), banana groves, orange groves, heaps of peanuts drying in the sun.

THE PRINCESS CURSE BRINGS BAD LUCK

In a day or two I sailed dribbling down Sibutu Passage bound outward to the Celebes Sea and Pacific. It was so calm that four days after leaving Tawitawi we still could see the place and the uncrowned Prince of Malasa was sworn to around the decks for bringing the curse of Princess Sarawi upon us. He would not stay in Tawitawi and now we could not go.

After leaving Tawitawi our progress for

a week was so poor that I began to despair of making the passage to Sydney. It was so calm the clouds were mirrored perfectly in the sea by day and the stars by night and the sails hung so lifelessly that half their shade was robbed from them.

The helmsmen barebacked stewed in their sweat at the open wheel. The pitch bubbled up in the seams and stuck to the boys' feet burning them. The drinking water was insufferably hot and always in the limpid depths alongside where we might have swum lurked huge sharks.

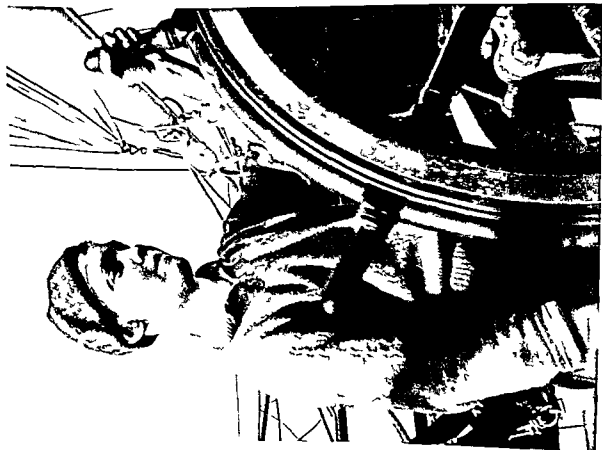
The galley refuse of three days lay alongside not moving. Some tins thrown overboard two days out from Bongao were still there on the fifth day. The sight of them grew oppressive and we fired at them to sink them (page 220).

Calm calm. Always the accursed calm. Where was that Prince of Sarawi, rejector of the Princess' hand? Stormalong kept out of sight for wrath was hot against him. Beginning as a joke in the course of the monotonous days the boys' anger became real. If the calm had gone on a week or more they would actually have thought that Stormalong's rejection of the Princess was responsible for it.



STORMALONG, WHO JILTED A PRINCESS, BECAME THE SHIP HOODOO

Upon leaving Malasia the *Joseph Conrad* drifted for 10 days making only 200 miles. The crew became so exasperated that they threatened to take it out on this 14 year old playing with one of the ship's two kittens (page 229). Many of the halyards brails buntled braces and other gear used in handling the sails and yards are in the hold.



STANLEY SOUNDED TOO LUBBERLY SO STORMALONG HE BECAME

The first mate refused to bello v Stanley Goodchild along the decks so this cider was given the name of a salt in an old sailing ship chantey. He became a great little sailor and could make fast by himself the mizen royal one of the highest sails. A dark Princess of Malasia fell in love with him but he refused her proposal because his ambition is to command a four masted barque!



A photograph from The Sydney Sun

ALAN VILLIERS MASTER AND OWNER OF THE 'JOSEPH CONRAD'

Since he was 15 years old Mr Villiers has wandered over the world in square riggers in all capacities from cadet to master. In the *Conrad* he was master, doctor, chief instructor of the apprentices and navigator. An Australian by birth, he served his apprenticeship in South Pacific barques and the Cape Horn grain trade to England, but he has also been a newspaper man in Tasmania and London and has written many books and articles on the sea.* He now lives in Brooklyn for he says "You can see the ships from there."

Then we moved on a little south of Manado with the slave island Sarangani in sight for two days whenever we cared to look in its direction through the rain. Certainly in a sailing ship one has a good look around. Too good, sometimes I thought I would have to change my route after all and go south about. But how could I do

* See in THE NATIONAL GEOGRAPHIC MAGAZINE "Racing the Horn in a Windjammer," February, 1911; "Cape Horn Grain Ship Race," January, 1913; and "Where the Sailing Ship Survives," January, 1915.

that now? Or go anywhere, with out wind? No, I had to keep on as I had begun, for better or for worse, we were committed to the northern passage.

Besides, I knew that if I could find, in the wide streams of the west setting equatorial current, the narrow river of the counter-equatorial setting east my progress would be very much better.

INTO THE PACIFIC—AT LAST!

We had not even entered the Pacific then. But calms depart, and at length came a sunny morning with a fair wind when we dashed out into the Pacific's blue through the narrow gateway of Kawio and Ma

more Islands with the Celebes boats out fishing a score strong and sailing swiftly out of our way for fear of this strange apparition. A single-top's full rigged ship had not passed that way in half a century.

Kawio with its beaches and coconut groves seemed one of the most picturesque islands of the whole voyage. I should have liked to anchor there, but I could not waste fair wind. We ran on and Stormalong crept about the decks again.

So we came to the Pacific, found the east setting counter-equatorial and sailed on. On and on and on a long hot hard road. It rained every day and sometimes blew,

though often we had days of doldrum conditions. But the current was strong and we progressed steadily to eastward, to the western Carolines, past Sonsorol and Pulo Anna, and Merir, and all those other low islands of the Japanese mandate.

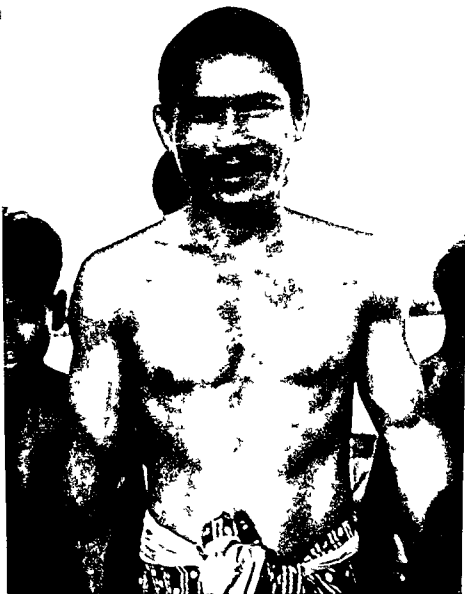
We saw the blue streak of Sonsorol early one morning, but I did not go in there, nor into any other of the Japanese islands.

At length we progressed until we had sufficient longitude run down to head southward toward the strait between Bougainville and New Ireland. I turned south then, crossing the Line for the third time since leaving England on the 49th day out from Singapore.

We found the doldrums again, stifling hot and calm with the glassy sea sometimes ruffled fleetingly by faint whiffs of wind that went before the yards could be braced to them and that always seemed to take the ship aback, robbing her in stern way of far more than they would have sent her ahead.

There was a long uneasy swell as if the great volume of the sea itself hot and broiling felt the intense unending heat of the overhead sun and panted in protest.

But it did not get heated and rose and fell slowly in great content as if nothing would have pleased it more than for us to stay there forever.



WELCOME TO BALIMBING FROM A PIRATE CHIEF

Once villagers in the Sulu Archipelago were a scourge of the eastern seas. Now their children go to American type schools built on stilts on the pleasant shore near their sea homes (page 224). Their parents brought long murderous knives for sale to the crew of the ship. This man spoke Spanish but no English.

But these were passing moods. It rained and the air cleared. It blew and tempers were cooled. Somehow life seemed better again and the sea, though still a worried mirror of the dead sky, not so utterly heartless and bitter, so cynical and depressing.

A BIRD VISITOR HAS TROUBLE BALANCING ON THE MAIN YARD

Sometimes we found things to interest us even in the calms. A bird flew aboard one evening, very tired, a land bird by the look of him, from some lagoon in the Carolines. He rested on the main yard but could not balance there with the rolling

He fell on the lifeboat cover and we took him from there, expecting him to die. We gave him water and he rested.

Next day he was lively enough, busily examining the decks for food. He was later identified as a young bird of the curlew family, and was named Oscar.

The bird soon made himself at home, though at first it was difficult to find something he would eat. We found some suckers on the log rotator and these he ate with relish, we caught some sharks, and he gobbled up the suckers from them. But before long he was not at all fussy, eating whatever there was going, as everyone else did.

He got to know his name and ran to the galley when the cook called him. He had a bath of sea water in the scuppers, and spent hours each day happily bathing. He was a nice bird, Oscar, though he could never get over an undue interest in fresh paint.

WATERS WHERE SHARKS ABOUND

Sharks we often caught. The boys cut out the backbones for walking sticks, but we never tried eating the meat. Once after a small shark had been lying in the scuppers nearly half an hour, disemboweled, with a capstan bar rammed down its throat, it was thrown overboard and promptly swam away. But another shark, much larger, attracted by the blood, rushed at it and ate it in a wild flurry of blood and foam.

Several times we saw large sharks leap violently out of the water and thwack themselves down again in what seemed an effort to rid themselves of an undue accumulation of suckers. On odd occasions a sucker was dislodged, but they always came back again and the shark soon gave up the effort.

Bonito, albacore, porpoise, and dolphin we saw, though we never caught any. Some times flying fish flew on board in the night. Whoever found them ate them.

By this time the vessel was becoming pretty foul on the waterline, and I began to think of putting into some convenient lagoon to careen and clean her up. But where was there such a lagoon? The islands round those parts are largely volcanic, with few anchorages and no harbors. There seemed only one place that would fit the bill: Nissan, northernmost of the Solomon Islands, not far from New Ireland.

I changed my course to make toward Nissan, which was more or less in our way. After some days we picked up the heights of New Ireland, and later Feni and Tanza-

and Lihir Islands. The wind was fresh from the southeast and I had to beat standing in close to the New Ireland shore but not putting in anywhere.

We saw nothing except the trees of a coastal plantation now and then, once a Japanese steamer went past loaded down with wheat from Australia.

The wind was still ahead. I beat and beat, carrying as much sail as the little vessel would stand. We were 56 days out from Singapore before the low atoll of Nissan came in sight. In the evening we were close by, but the place is little known and the Sailing Directions were not even sure where the entrance was. It is "apparently" between Nissan and the small island of Barahun, but all the charts are different.

It was foolish to attempt to enter such a place in bad light, without proper precautions, so I shortened down and stood off and on for the night.

In the night it blew up half a gale and we were blown away.

Two days later, we were back again in a wind so fresh that the little ship staggered under the tallants. It rained and the weather was dull and threatening. I got close to the entrance, but again could not go in. I would not go in there without an examination first, I wanted to send in a boat to sound.

My disagreeing charts all agreed that there were fourteen feet of water in the apparent entrance, but coral grows, and I wanted to know, before I took the ship that way, that what was described as apparent was also real.

I must send in a boat. But how? The weather was too bad.

BRAVE MEN IN A DINGHY

I stood away again this time in some dejection. It did not seem possible that we should ever come to Nissan. But the weather fined in the later morning and the wind decreased, so I stood back again close to the entrance as I could safely get and sent in the dinghy with the carpenter and two of the best men.

Their instructions were to sound thrice (enough in the entrance (which they had first to find), and then if there was water enough there to float us in safely, to hoist a French flag on an oar.

They went in, and we stood off and on. Then the wind freshened again until it was blowing more than a strong breeze. The



Photo graph from The Sydney Sun

RISEING AND FALLING TO A CUNTLF SWELL JOSEPH CONRAD HEAVES TO OFF SYDNEY
HEADS TO DISEMBARK THE PILOT

This ancient maneuver brings the vessel to a stop while still keeping her sails set. But it is different from heaving to in heavy weather when canvas is so much reduced that the ship lies quietly shoulder to the sea giving to the gale and the scend of the waves. Great steamships in the Atlantic lanes heave to when gales become too dangerous to be fought longer by slowing engines so that the ship merely keeps her head to the sea. Here the *Conrad's* small size is emphasized by the men on the forecastle head who are cutting or securing the anchor with its chains the shank painter and the ring stopper.

He fell on the lifeboat cover and we took him from there, expecting him to die. We gave him water and he rested.

Next day he was lively enough, busily examining the decks for food. He was later identified as a young bird of the curlew family, and was named Oscar.

The bird soon made himself at home, though at first it was difficult to find something he would eat. We found some suckers on the log rotator and these he ate with relish. We caught some sharks, and he gobbled up the suckers from them. But before long he was not at all fussy, eating whatever there was going, as everyone else did.

He got to know his name and ran to the galley when the cook called him. He had a bath of sea water in the scuppers, and spent hours each day happily bathing. He was a nice bird, Oscar, though he could never get over an undue interest in fresh paint.

WATERS WIFRE SHARKS ABOUND

Sharks we often caught. The boys cut out the backbones for walking sticks, but we never tried eating the meat. Once after a small shark had been lying in the scuppers nearly half an hour, disemboweled, with a capstan bar rammed down its throat, it was thrown overboard and promptly swam away. But another shark, much larger, attracted by the blood, rushed at it and ate it in a wild flurry of blood and foam.

Several times we saw large sharks leap violently out of the water and thwack themselves down again in what seemed an effort to rid themselves of an undue accumulation of suckers. On odd occasions a sucker was dislodged, but they always came back again and the shark soon gave up the effort.

Bonito, albacore, porpoise, and dolphin we saw, though we never caught any, some times flying fish flew on board in the night. Whoever found them ate them.

By this time the vessel was becoming pretty foul on the waterline and I began to think of putting into some convenient lagoon to careen and clean her up. But where was there such a lagoon? The islands round those parts are largely volcanic, with few anchorages and no harbors. There seemed only one place that would fit the bill, Nissan, northernmost of the Solomon Islands, not far from New Ireland.

I changed my course to make toward Nissan, which was more or less in our way. After some days we picked up the heights of New Ireland, and later Feni and Tanga

and Lihir Islands. The wind was fresh from the southeast and I had to beat, standing in close to the New Ireland shore but not putting in anywhere.

We saw nothing except the trees of a coastal plantation now and then, once a Japanese steamer went past loaded down with wheat from Australia.

The wind was still ahead, I beat and beat, carrying as much sail as the little vessel would stand. We were 56 days out from Singapore before the low atoll of Nissan came in sight. In the evening we were close by, but the place is little known and the Sailing Directions were not even sure where the entrance was. It is "apparently" between Nissan and the small island of Barahun, but all the charts are different.

It was foolish to attempt to enter such a place in bad light, without proper precautions, so I shortened down and stood off and on for the night.

In the night it blew up half a gale, and we were blown away.

Two days later, we were back again in a wind so fresh that the little ship staggered under the gallants. It rained and the weather was dull and threatening, I got close to the entrance, but again could not go in. I would not go in there without an examination first, I wanted to send in a boat to sound.

My disagreeing charts all agreed that there were fourteen feet of water in the 'apparent' entrance, but coral grows, and I wanted to know, before I took the ship that way, that what was described as apparent was also real.

I must send in a boat. But how? The weather was too bad.

BRAVE MEN IN A DINGHY

I stood away again this time in some dejection. It did not seem possible that we should ever come to Nissan. But the weather fined in the later morning and the wind decreased, so I stood back again, as close to the entrance as I could safely get and sent in the dinghy with the carpenter and two of the best men.

Their instructions were to sound thoroughly in the entrance (which they had first to find), and then, if there was water enough there to float us in in safety, to hoist a French flag on an oar.

They went in, and we stood off and on. Then the wind freshened again until it was blowing more than a strong breeze. The



Photograph from The Sydney Sun

RISEING AND FALLING TO A GENTLE SWELL, JOSEPH CONRAD HEAVES TO OFF SYDNEY
HEADS TO DISEMBARK THE PILOT

This ancient maneuver brings the vessel to a stop while still keeping her sails set. But it is different from heaving to in heavy weather when canvas is so much reduced that the ship lies quietly shoulder to the sea giving to the gale and the scend of the waves. Great steamships in the Atlantic lanes heave to, when gales become too dangerous to be fought longer by slowing engines so that the ship merely keeps her head to the sea. Here the *Conrad's* small size is emphasized by the men on the forecstle head who are catting or securing the anchor with its chains the shank painter and the ring stopper.



SCANTY CLOTHING IS ENCOURAGED IN THE TROBRIANDS

Attempts to introduce cotton garments among the natives of the islands are frowned upon by the colonial administration because tuberculosis and other diseases take a terrible toll. In sun bathing in the warm climate is healthful. Many layers of grass make this young matron's skirt as thick as a rug.



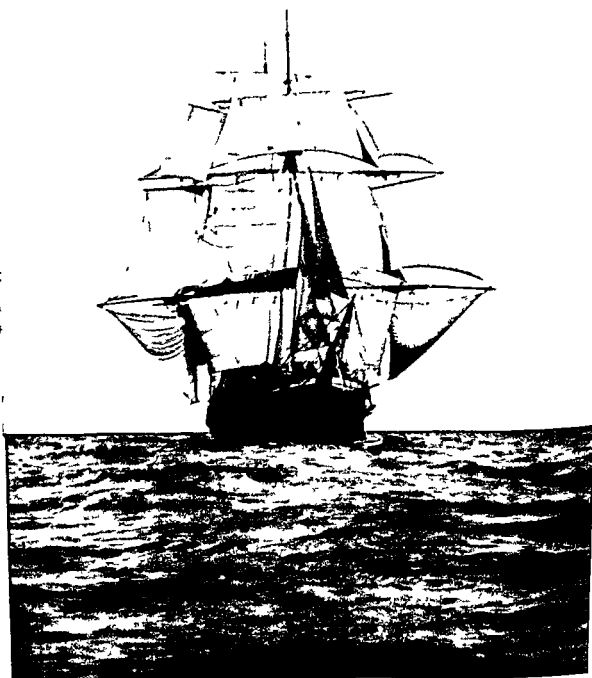
THE HAUGHTY SON OF AN ISLAND CHIEF COMES ABOARD

Ornaments of clamshells duster the ears, his hair grows fuzzy and wild, his chest is deep and his arms powerful as becomes the principal young man of Santa Catalina. Many tenders swarmed aboard but girls no longer swim out to welcome strange ships—unless the mermaid is chance to be shot of tobacco!



AIIRIWINA IN THE TROBRIANDS IS A HAPPY ISLAND OF MARKET GARDENS, PEARL DIVERS, AND LARGE THATCHED ROOFTD VILLAGES

Packed off her course by a strong adverse current, the *Joseph Conrad* put into this little island to resew her torn and weathered sails. Natives swarmed about the ship in their canoes bringing sweet potatoes and fish to exchange for stick tobacco and an invitation to visit their homes. Here a government officer came out and insisted that the ship proceed to Samarai, the port of entry, some 200 miles off her course, failing to realize that the *Conrad* being a square rigger could not steam at will but was dependent upon wind and tide (page 243)



STUNNELS ALOW AND ALOFT, THE LAST FULL RIGGED SHIP ROLLS ALONG ON HER VOYAGE
AROUND THE WORLD

Well over 50 years old the *Joseph Conrad* is stoutly built of Swedish iron and teak and is good, says her owner, for another half century. Here she carries her studding sails (stun'ls to sailors of bygone generations) which are difficult to set and dangerous in sudden shifts of wind. These extra sails set on special booms fastened to the ends of the yards were the equivalent of another mast of sails and increased the speed of the vessel at least a knot. In sudden heavy weather stun'ls are a nuisance for it requires much time to take them in (page 241). The *Conrad* carried no studding sails for the royal or topmost yards.

sea rose and it began to rain. The sea increased so much I did not think the dinghy could come out. Icrip it was lost!

I search the seas anxiously. no dinghy. Wind and sea increase. still no dinghy. We have been getting farther from the island. I wear again and stand in on the dangerous tack toward Barahun. The island is now a lee shore but I have to find the dinghy. Many sharp eyes look out from aloft.

I do not think myself that the dinghy will dare come out. probably it lies in the entrance showing the French flag, or maybe not. But there is nothing in the entrance.

I stand toward the island on and on. It is ticklish work. I do not want to stand so close on that lee shore that I cannot get away again but I must find the dinghy. Now I steer toward the entrance, the break between Nissan and Barahun, conning from the fore crossrees. I have decided now that the dinghy is waiting there. I will chance the French flag.

There they are. They *ha c* come out in that frail pine dinghy. But they are real sailors.

The sea is so high now I cannot see the dinghy until we are close upon it and then the first thing I see is the French flag flung high on a crest. I run down upon them pick them up quickly as we roll past and leave the dinghy on a long line astern.

There is an entrance they say between Nissan and Barahun, the least depth they had was 16 feet. (We draw a fraction over twelve.) Inside the lagoon they had 12 to 20 fathoms water enough in there. It is only the entrance that is dangerous.

A TICKLISH PASSAGE

Well we are pretty close now. I square up and stand in under easy canvas. The wind has increased to a moderate gale. From aloft I can see no entrance though now we are pretty close. The sea breaks furiously on a reef which seems to extend right across. But as we come in I see a break quite close to Barahun. How narrow. And there the bottom is clearly to be seen. Sixteen feet? I hope so.

We are on it now. Beside us from the crossrees I see the rocks and hear the surf's roar and glance at the coconut palms of Pokenium so close and there ahead the water seems to shallow again ominously.

We have good way. She makes eight knots under only the fore and main topsls

the foresl and a few staysls with good men at wheel anchor windlass and all four lead lines she rushes in. I hold my breath aloft as she comes on.

There is little sea here now. thank God for that! We straighten in the coral gate way to choose the streak of heaviest green from the confusing array of surface colors ahead colors that vary sharply, indicating the shoals and the depth of water. I have not much time to choose.

Quickly! Starboard a little! Ah she comes—sturdy now! It is the place of darkest green in a poor selection there seems to be a shallowing inner bar right across. Sixteen feet? I *hope* so!

But there is. She comes across. The fish slit frightened in the gloomy depths the water deepens and the flattened area of the huge lagoon is now around us. We are across the bar and I have only to choose an anchorage. I get away from the entrance and let go. Within ten minutes the native canoes are out to us wanting tobacco selling pigs (page 228).

In the evening I landed at Pokenium to watch the primitive natives broiling their evening meal of fish taken straight from the lagoon. I walked a while through the white man's abandoned plantation on the point where the depression has left the buildings derelict and the coconuts strewn heavily on the sodden ground.

A SOUTH SEA ISLAND IDYL

The sun's setting over the broad lagoon was beautiful. The quietened wind sung softly in the high palms and the blue waters lapped lazily on the golden inner beach while the surf of the wild Pacific roared outside. It was all peaceful and romantic and vaguely adventurous as a South Sea island ought to be.

But in the lagoon the long shapes of hungry sharks were often seen and the fierce sting ray abounded. The golden beach soon gave way to a jagged coral strand poisonous to bare feet behind the plantation clearing the jungle was a dank moldy swamp and through the high palms pretty soon it rained.

The people? Melanesian and I'm afraid not very interesting. They might have been once but now the remnant is gloomy scabby sad. A wholesome upstanding clear skinned specimen is rare.

The men are more handsome than the women are quiet speak pidgin English

volubly, wear loincloths and (if at all possible) felt hats, live in grass houses in small, compact villages, dislike work, like bargaining and tobacco.

Especially tobacco. For this they brought out coconuts, limes, and other fruits, pigs, fish, bows and arrows—every thing they had. But it had to be the right kind of tobacco, a strong, black twist of American manufacture used as currency among the South Sea islands for years.

In addition they always demanded a supply of paper newspaper by preference, though a few pieces of toilet paper would do. With this they rolled stout cigarettes, one whiff from which would send many a European under the table.

SOAP AND PEROXIDE IN DEMAND

They were also mildly interested in highly perfumed soap (though I think it was the perfume that attracted), in gaily colored loincloths, and peroxide. This they used to bleach their hair, a fashion that has been current among them for years, although formerly they used lime. With a head of thick, peroxidized hair surmounted by a brilliant red flower a Nissan brave felt good enough for anyone (page 242).

I had no peroxide to spare. What I had I used for medicinal purposes, which the natives regarded as a great waste.

I had gone in there to heave down the ship if I could, to clean at least the upper strakes beneath the waterline. To do this I first roughly surveyed the lagoon, choosing a place where I could bring the ship in almost to the beach, which rose steeply and was lined with trees.

I brought her there and anchored her, bow and stern mooring her in line with the beach. Then I carried out lines to the trees to hold her fast and rigged tackles from the fore and main cross-trees to other trees. When all was ready, all hands hove away on the tackles, heaving the ship over. She came fairly easily at first, but then stubbornly, so that it took all hands a hard morning's hauling to get her over.

But it was interesting work. No one in the ship (including myself) had ever seen it done before. It was prehistoric almost like the single topsail ship. But we enjoyed it, and we cleaned the ship and learned a lot.

We stayed in under the trees two days and then warped out to a safe anchorage. It flew fresh every day and every day it

rained, though this was allegedly not the rainy season. The rain poured into the gloomy lagoon, fringed heavily with its monotonous circle of wet trees. The water was not blue on such days but black; the sun shone seldom, and, outside, the Pacific surf pounded on the coral without end.

It is all coral, coral crops out everywhere. Crabs scurry, huge bloated things, and in the marshes lean pigs grunt. Through the water fish flit, multicolored, at tremendous speed; the waving frondlike arms of the starfish and octopus stretch for their prey from every sea wet rock. In the forest the smell is of a dead land, rank, black, putrid almost, at times repellent and awful. Tropic paradise? Not Nissan's huge, gloomy lagoon.

Yet when the sun shines it is attractive enough, even beautiful in a somber way, and there are fair coves on Barahun. But in the lagoon sea snakes swim and sharks by the foreshore you dare not paddle because of the poison prongs of the vindictive stonefish, lurking invisible.

Morose Nissan! It all seems brooding, resentful, sad as if it did not care for the coming of the Sailing Gods, the gods who brought copra, and weird beliefs that never seemed to bother them very much and a fierce desire for profit and for trade, and guns and disease. No, perhaps Nissan nor any other South Sea island, does not care for these Sailing Gods, from whom the islanders of old prayed for deliverance.

I sailed for Tulagi, on Florida Island in the Solomons, early one hot October morning. We were destined to be within 500 miles of Tulagi for the next six weeks, and the wind never came from the nor west nor from any other direction that was fair once in all that period.

FIGHTING SEA AND HEAD WINDS

First it was calm. Then it rained. Then it blew strong from the east and the south-east and the east-southeast. Then it was calm again, and after that blew up a moderate gale.

Where were those idyllic breezes of the blue tropic seas? We waited for them in vain. A cloudburst a day and the most difficult conditions for windward sailing we had ever known were our lot. But at least it was warm, sometimes too much so.

I beat and beat, telling a press of sail in the strong winds to make up for the effect of the adverse current in the calms.

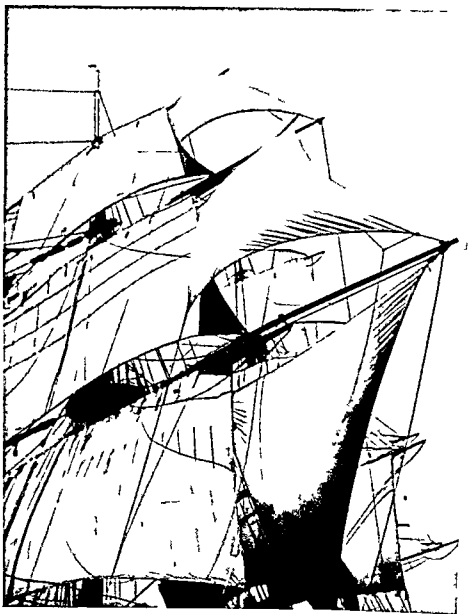
The current there was setting to the west and west-northwest, taking us in toward New Guinea, setting us back steadily, until I found myself driven to the westward of the Lusancav Islands within sight of the high mountains of the New Guinea coast.

Now this was interesting, but not bargained for. I had to get to Tulagi for water and provisions. If I went into New Guinea, I would have to wait for the nor west season to get out again.

It blew hard again from the southeast and the current strengthened. My sails began to go, chafed and worn from the long passage in the rain and the tropic sun. The fore and main t'gallants were split and also the main royal and the inner jib thrice re sewn was blown to pieces.

It was with no pleasure that I looked upon the westernmost of the reef surrounded Lusancavs lonely, uninhabited islands and went about to stand out to sea again in a long fight to make to the eastward.

For days this went on days that grew into weeks fighting the sea and the fresh head wind and the strong current. A square-rigged ship I regretfully concluded after sailing 300 miles in two days to lose



NOT SEEN FOR MANY YEARS—STUNNELS IN THE CHINA SEA

Clearly shown here is how the historic studding sails are set. They are sheeted out or fastened to booms rigged through Irons on the yards. Halyards and sheets come down to the deck and the sails can be both set and taken in entirely from below (page 238). Studding sails of the *Joseph Conrad* bore the maker's imprint and the date 1887. Still in excellent condition was this light duck canvas though it had been on the ship throughout her long career including two duckings when she was sunk in collision with a steamer in 1905 and again when she was blown ashore in Brooklyn New York in January 1935.

twenty, is *not* the rig for windward work in those reef strewn and current filled waters. An auxiliary schooner is the thing for the islands. I had to admit and the stronger the engine the better.

BEATING ON WITH TORN SAILS

I beat on. More sails began to go. I had of course the trade wind suit aloft. The good Cape Horn sails were stowed below, waiting for the west winds and the Roaring



LIVING OFF THE BEATEN TRACK, THE TROBRIANDS ARE ONE OF THE FEW UNSPOILED GROUPS LEFT IN THE SOUTH PACIFIC

The *Joseph Conrad* called at these Australian controlled islands near the southeastern tip of British New Guinea. Biggest houses in the village are for storing yams not housing chiefs. Logs carefully fitted together at the corners with air spaces between them and placed on stilts form the walls of these thatch roofed storehouses. In the daytime the chief rarely goes inside of his home with the tall doorway in the center, preferring to remain outside in the sunlight.



FROM A COMMON BOWL, KIRIWINA BOYS HELP THEMSELVES TO KAI KAI. Pearl oyster shells serve as spoons at this alfresco meal. Larders are a favorite item for trade with

Forties and the storms of Cape Horn. It began to look as if the trade wind sails would not be good enough to complete the voyage. The topsls began to go, and after them the courses.

I still beat doggedly to get away from the Lusancays, round which the current to the west seemed to swirl with strength and even violence, try as I might, I could not get out of the current. The sails aloft were now getting in such a sorry state that I had either to repair or change them. We had no chance to repair them, and I did not wish to bend the Cape Horn suit and spoil that, too.

So I began to look around for an anchorage in shelter, where we could lie a while and make the sails fit to continue the beat to Tuligi.

There was no anchorage in the Lusancays. I stood in as close as I dared to several of the islands, to find no shelter anywhere—nothing but the low islands and the vast area of surf around them and beyond, with the sea breaking and the whole aspect wretched and ferocious. I must go to the Trobriands (see opposite page).

I saw on the chart that there was a Government station at Losua, on Kiriwina Island, that would be the place, if I could make it. The anchorage there looked good enough. But how to get there?

I beat on, beat and beat, with the torn sails, and the ship staggering and the warm sea spilling over her and driving in heavy sprays across the foredeck. It was miserable sailing most of the time—out a hundred miles to sea, tack and stand toward the land again, hoping always against hope to come within striking distance of the channel between Kiriwina and Kaileuna leading to the anchorage and sometimes making twenty miles, sometimes losing thirty.

The current was a savage enemy. Some of the boys began to lose heart about it but in a sailing ship you have to keep on and on.

FINDING BOTTOM—AT LAST!

Eventually, after a solid week of heavy beating, I came to the entrance of the Kiriwina channel just after sunset on a black evening. There were no lights, but I was not going to stand out to sea again, to be driven off.

I stood in groping my way carefully in the channel with the leidsmen going and the ship under easy sail, conning her from

the jib boom end with the narrowing channel closing in and the trees so near.

It is impossible to judge distance at sea by night, how close seemed the trees! Yet the leidsmen, sounding to 40 and 50 fathoms with the deep-sea lead, reported constantly no bottom.

No bottom! The ship came in and in; was there no anchorage, then? There must be! I knew I could not go in too far. I knew that the wide bry of Kiriwina was almost wholly blocked with reefs; I had to find an anchorage before the ship sailed in that far. It was pretty close then.

No bottom, no bottom! The chant grew worrying, the trees closer. I could hear the quiet night surf breaking on the coral and see the lights of natives fishing here and there. Then suddenly the water shoaled. The leidsmen had bottom at 19 fathoms, at 9 fathoms, at 6.

Hard a starboard! Into the wind with her to stop her way. Let go! The cable roared, she brought up nicely. The sails were furled and the yards trimmed. We were further from Tuligi than we had been at Nissan, two weeks before but we were in some shelter now and had at least the prospect of a welcome break from the hard beating.

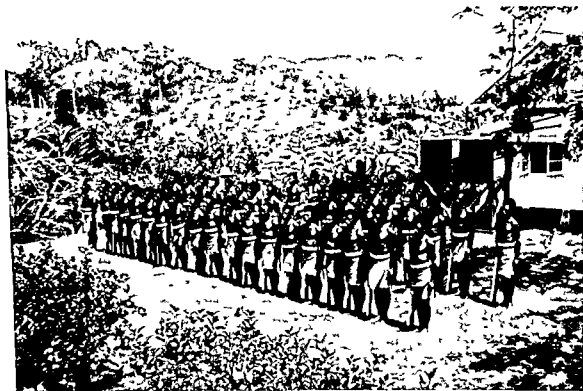
In the morning there came the man from the Government demanding whether we had been to Samarai, on the south-western tip of New Guinea. No, we hadn't been there, weren't going. We were on passage from Singapore to Sydney and had been driven out of our way. Our sails were torn and had to be repaired.

Well, said the Government, Samarai is the port of entry and you have to go there first. It did not seem to occur to him that it was an impossible demand to make of a square-rigged ship—that she should negotiate 200 miles of difficult waters, to leeward, merely to secure the proper rubber stamps.

If I went to Samarai, how could I get back? If I had got there, I would have had no need to put in at the Trobriands. No, I hadn't been and I wasn't going. I didn't want to go to the Trobriands, either, but I was intending to repair my sails.

There were times on this voyage when I felt envious of the circumnavigators of old whose welcome around the islands was a canoe full of brown men throwing spears.

However, the Government man at Kiriwina was decent enough when the situation was properly explained to him. He was not



TULAGI NATIVE TROOPS PARADE OUTSIDE THE LOCAL LEGISLATURE

These police are smart tough fellows but there is not much work for them in the Solomons now. Their officers are European. This town is the British headquarters in the islands and of course golf, tennis and cricket are played here by the white district officers (opposite page)

accustomed to receiving full rigged ships, indeed, our arrival at Losuia was the first unheralded coming of an ocean going ship in his experience, for Kiriwina is an island little visited these days

AN ISLAND OF HAPPY NATIVES

To the natives, of course the visit of the ship was a great event. Shortly after day light they were out in their fine canoes with yams and sweet potatoes and grass skirts and betel gourds and clubs and paddles and fish, all of which they wanted to exchange for stick tobacco. A sturdy lot, wearing almost nothing, they seemed the most cheerful and unspoiled natives we had yet met.

Ashore their welcome was quiet but sincere crowds waited on the little jetty whenever we came in with the lifeboat for water and stores, anxious to help us to have us join in their cricket matches on the mission field (the missionaries were away at some conference).

Kiriwina is an island of market gardeners and pearl divers an intensely interesting place of large villages, happy natives, and

ordered living (page 237). In its midst is the Government station of Losuia where the blue Papuan ensign flies, and there is a jail for tax defaulters and adulterers and what ever other wrongdoers may be found.

In the Government ground the prisoners were at work, somewhat morosely, with warders watching them but their lot was not hard and there were not many of them. Outside on the mission compound children romped the elders played cricket, and whenever we walked in the clean coastal villages many natives came to talk with us and to offer fruit and make us welcome.

YAMS AND SWEET POTATOES

I liked Kiriwina so did all hands. But we were seldom ashore and saw little of it. We unbent our sails, changed them where necessary, and thoroughly repaired the others. We took in some water and a supply of yams and sweet potatoes, and sailed as soon as we were able.

Tulagi was still more than 600 miles away, and I did not know how I was going to get there.

After Kiriwina came the same old hard

beat again to windward toward Tulagi. Nothing of the nor west season ever is much as shimmered one cloud we slogged on. Usually the wind was fresh from the east southeasterly so that with the ship able to lie up six points I could take my choice between making toward the south on one tack or the northeasterly on the other, neither of which directions unfortunately was anywhere near the course. But at least we were soon out of the worst of the current and that was something.

TROPIC SAILING UNDER DIFFICULTIES

In the nights it was often miserable beyond words with endless cold rain and sometimes hard squalls and sometimes dol drums with cats paws from all directions and a big swell in which the ship jumped so violently that it was difficult to stand and the night so black it was impossible to see even the tops of the deck.

As a change from this there was always the probability of a moderate gale to my surprise somehow I had counted upon this part of the Pacific as being free from these petty annoyances. The tops were newly repaired at the Trobriands began to go again in disgust I sent the Cape Horn suit aloft in their stead.

After many days we picked up the Solomons at Rendova and Tetipari Islands only to be blown away again for half a week. Then it was calm. We were 93 days out from Singapore before we came at last to Tulagi though we had been only 49 days to the line.

We made out the heights of Florida Island late on a quiet afternoon coming in past volcanic Savo from the northern end of Guadalcanal but it was night before we were off Tulagi Harbor.

A CALL AT THE SOLOMON ISLANDS CAPITAL

Again I had to enter a bad harbor by night though this was lit. I had not been able to get a chart for Tulagi in Singapore and had penciled one as well as I could from the data in the Sailing Directions. The place abounds with small islands and reefs and I was glad to get the anchor down.

Ninety three days from Singapore. It had been a long hard road beset with navigational difficulties worse than any storm, hot wet sometimes depressing through the China Sea Sulu Sea Celebes Sea and the Pacific all strewn with reefs and

low islands, filled with incalculable sets liable to all manner of disturbances.

Nor was Tulagi a very interesting place. The Government administrative and business headquarters of the Solomons are there a small Chinatown (as is common in most of the islands) and little else. It is a small island of high hills and tin roofs with a club golf links tennis courts jail wireless station Government house ice works and so forth the whole largely populated with excellent citizens who rarely go off it except to Brisbane or to Sydney (opposite page).

Florida Island while geographically of the Solomons is most certainly not representative of them. It is frankly a headquarters for white living a place where laws are—well not exactly made since that apparently has to be done somehow between Downing Street and the Fijis but thought over discussed and sometimes vaguely suggested where white meets white lives with white thinks white and plays golf and tennis and cricket.

And works of course. There is enough of that the administration is not overstaffed. The Solomons are a large area with troubles enough to be smoothed over though it is ordinarily the district officers who go out and attend to them. These men are not found in Tulagi though now and again their trim craft look in for stores and to deliver reports.

One gathered even in a brief stay of a week or so that all is far from quiet in the Solomon Islands. The natives (not many of whom are to be seen around Tulagi except police prisoners houseboys and schooners crews) have deep rooted objections to the idea of taxpaying which objections are apt to result in direct action.

We went alongside at Makambo and were hospitably received.

The boys played cricket with a Tulagi eleven though I had to send some baseball experts to complete our side and a Finn and a Dane who had never seen cricket in their lives.

ON THE TRAIL OF JACK LONDON

Then we moved on to Berande on Guadalcanal about 10 miles away. Berande was a large plantation of coconuts and rubber where hospitality has been traditional for generations. It was at Berande that Jack London stayed (and afterward wrote a book which residents claim is not com-

pletely accurate), since his time visitors of all kinds have met with kindness.

The boys rode lively young horses along the beaches and through the wide plantation fields, saw copra cut and dried, and the wild Malaita labor practicing a stamping dance for the Christmas celebrations.

We saw labor given its ration of stick tobacco, soap, and matches on Saturday afternoon, and the trade store opened for them to make such purchases as they wished, clay pipes, mostly. We visited small villages near by, each with its church and its old men seated under trees. We rode to Tetere along the coast to see the monument to eleven Austrians from the *Albatros* who were murdered.

It is not so long since the white man had to walk warily here and life was cheap, both brown and white. But the Government and missions have brought a change, and killing is rare.

We traveled in an 8-cylinder American car, the only one we found in the Solomons, along a new bush track to what may some day be a gold field rivaling New Guinea's Morobe. The track was a winding forest trail that sped past jungle and native garden and sometimes left the matted growth with unexpected suddenness for a wild career over a treeless plain which, without any reason whatever, quickly emerged.

There were several of these plains, all large, all uncultivated. Then we came to a mountain stream and the boring machines, and got out and walked. The country was wild and primitive there.

There is gold in the hills behind Berande. Now and again, one heard, the chief out there sends in a nugget or two, though no one knows exactly where he gets them. But if the white man gets any, he will earn them. Mining of any kind under such conditions must be expensive and difficult and is likely to remain so.

BEWILDERING NAVIGATION

I sailed in the early morning from the anchorage off Berande, making down the passage between Guadalcanal and Florida Islands toward the open sea. The wind drew ahead again and I beat and beat.

The combination of navigational difficulties presented by these islands is such that I wonder the early navigators survived them. There are deep troughs surrounded by reefs, shallows serrated with rocks, and coral growths over which tidal waters boil and eddy, discoloration from the mountain

streams which muddies the water so that the coral heads cannot be seen, brilliant winds, now light, now strong, changing so often and so suddenly that one is bewildered even to know on which tack to keep the vessel, pitch black nights, and rain, poor anchorages, for the most part, high mountains coughing their williwaw winds, spilling their black rain.

Always through these confused waters is the general westward set of the trade wind drift setting the ship back and back.

Suddenly ahead reefs loom up, I must go round quickly, to save the ship, yet to make any progress in the head winds I must constantly steer deliberately toward danger. It is better in a powered vessel, which may pick her way, but many of those have been lost around the Solomons.

I had been anxious to make the Solomons, now I was eager to get away. I was beating now through Indispensable Strait, between Guadalcanal and Malaita, with the long island of San Cristobal in sight. I stood on toward the eastward trying to make toward Vanikoro and Santa Cruz and down through the New Hebrides to Sydney.

THE TROPICS BEGIN TO PALL

We did not make Santa Cruz, nor Vanikoro, nor any of those places. A week out from Berande we had made good only 100 miles, at that rate we would have been another month. I did not have the time or provisions to spare. A full rigged ship carrying 28 souls cannot remain cruising indefinitely. There is a limit to her water supplies, to the provisions she can carry, aye, and to the tempers of the crew.

The longer she stays around these tropic islands the greater the susceptibility to disease, fortunately I had not as yet been troubled with fevers or with elephantiasis (most hateful and repellent of tropic diseases, though rarely found in whites). But many of the boys had tropic sores which proved difficult to heal, and one or two had badly ulcerated legs. My medical work (for I was also physician and surgeon to the expedition, as well as master, navigator, chief instructor, guardian of the younger boys, and many things besides) now kept me busy for at least two hours a day.

The boys had stood up very well to the long demands of heat and rain, the long trial of baffling conditions and the hard slog to windward, but there was a limit for them and for everyone. The Tropics had begun to pall.



HEELED TO THE BREEZE, JOSEPH CONRAD' BEATS OUT OF SYDNEY HARBOUR

Photograph from The Sydney Sun

Close hauled on the starboard tack she makes for Bradley Head and the open Pacific. The foresail is hauled up and the mainsail (lowest sail on the tallest mast) is furled to make it easier to handle the ship in the difficult tacking. A quick glance at this photograph tells the sailor that the helmsman near the stern is steering a little too close to the wind or "pinching her" because the royals or upper sails, are fluttering. The helmsman of a square rigged ship usually steers, when the vessel is "by the wind" by watching the weather clew (right edge here) of the mizzen royal or upper sail on the mast to the left.

I saw by the chart that I could make one more group of islands and then run down to Sydney, inside New Caledonia, more or less with a fair wind.

This last group was the interesting pair of islands shown variously on the charts as Santa Ana and Santa Catalina, and Owa Raha and Owa Riki, lying a few miles from the southeastern end of San Cristobal at the eastern limit of the Solomons.

I knew nothing of these islands and the Sailing Directions did not add very greatly to my knowledge. But they sounded interesting and there was a good harbor at Santa Ana.

So I fell off, gave up the beat toward Vanikoro, and made for Santa Ana (Owa Raha). This was one of the few places which we were able to make easily throughout the whole voyage but the trouble was, I made it too easily and came by night. There were no lights and no moon. I sailed by, through the narrow strait between San Cristobal and the two islands (the breaking of the long Pacific swells on the reefs was fearful in the dark) and came back in the morning.

I was glad then that I had not attempted to enter by night, for the harbor of Port Mary was nothing but a small break in a dangerous wide reef.

I was mighty glad, too, that circumstances had sent me to this place. The people were friendly, clean and hospitable; the islands were interesting and lovely; and that night a trader came out to us who had been a master mariner and had served much of his time in the old *Parma*.

He had married the daughter of one Bugga Bugga, last of the paramount chiefs of Santa Ana, and was himself now a kind of uncrowned chief of the island.

MEMORIES OUT OF THE DAYS OF SAIL

What a man! He had not seen square yards upon a vessel in twenty years and was so wildly excited at sight of them again that he would not leave the ship.

He brought a stock of island yarns at the telling of which he was expert and a colored man from Philadelphia, some 70-odd years of age, who had been in Yankee clippers in his time and had been master of pearly vessels. He was now married in the islands and fished the *beche-de-mer* and sharks fins for China, he'd lost half an arm to the sharks but that did not seem to worry him. He danced a hornpipe when he came aboard and sang chanteys.

When we left the island, he and the uncrowned chief followed us for miles in their cutter, and the look upon their faces as they gazed upon the white square sails was profound and memorable. Long settled in the islands, they had not expected to see a full rigged ship come floating unheralded again into their lives. They gazed up, drinking everything in for this was the last time such a ship would come their way and they knew it.

We tramped about Santa Ana (the natives called Owa Raha Santa Ana and Santa Catalina they spoke of always as Owa Riki, selecting the shorter and more easily pronounced names in both cases), visiting the villages, some heathen, some Christian. They were all clean, orderly, and well laid out.

In the Christian villages were small churches, very simple and suitable. In the heathen strongholds were *tabu* houses in which were skulls of great chiefs resting in canoes and large representations of fish. Here no woman was allowed to come even in the Christian villages much of the old *tabu* system still survived.

We also visited Santa Catalina where the conditions of life today are much as Menafia found them some 370 years ago. Here there are no missions or missionaries, no schools, teachers or district officers. It is a small island, without a harbor, and there are only about 100 people, somehow with so much to do in the larger islands they must have been passed by.

A peaceful and industrious folk, they ask only to be left alone—a privilege rarely granted in these days to their kind. They were happy, healthy, contented. I saw no sullen looks or morose frowns. I heard of no conflict. The people were unclad and their homes were, of course, somewhat primitive. But they were clean and seemed well suited to the needs of their occupants.

The women and girls and the men danced for us separately; the women dressed in green branches and leaves and palm fronds and things and the men also attired in shrubbery. As the dance progressed (which it did for hours), the greenery steadily fell from them.

Their music was an orchestra of old men singing, rather monotonously, very solemn. The men used dance sticks and kicked at the earth quite a lot, their energy was amazing for they danced on with agility and determination hour after hour.

At Santa Ana they also performed a



Photograph from The Sydney Sun

CADETS OF THE "JOSEPH CONRAD," INCLUDING SEVEN YOUNG AMERICANS, POSE
IN SYDNEY HARBOUR

Only one 'Yankee' remained for the ship's midwinter rounding of Cape Horn. From left to right back row, are David Hunt, Quincy, Massachusetts; Harry S. Hopper, Merion, Pennsylvania; Adair Miller, Southport, Connecticut; H. Elv. Griswold Jr., Morristown, New Jersey; Jan Junker, Copenhagen, Denmark; John Devlin, Southsea, Hampshire, England; Ed Lane, New Canaan, Connecticut; Fred Sturges, Fairfield, Connecticut; Dennis Leech, St. Briavel, Gloucestershire, England; and seated Hilgard Pannes, Plandome, Long Island; C. J. Carmichael, Stellenbosch, Union of South Africa; Vernon Harcourt, Hayes, Middlesex, England.

weird old dance symbolic of the history of the place, wherein first a troupe of natives, clay covered and lurching unsteadily, came down from the trees and staggered to the water's edge, looking out to sea. With curious grace these tree dwellers tried to learn to walk, but while they were busily engaged in this a horde of strange marauders came, black men, fiercely visaged, and fell upon them in mortal fight. Some died on both sides and in the end the tree dwellers retired, driven from the island.

A PEOPLE WHO DID NOT KNOW HOW TO
COUGH

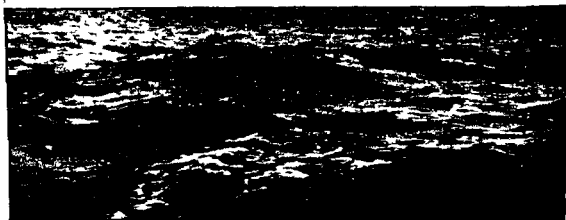
Now the newcomers took up the dance, dancing through history, giving perhaps a more accurate picture of it than they themselves knew. One saw Mendaña and his men come, and more fierce fighting (three of Mendaña's men were wounded here), and after that a century and more of peace

disturbed only by gales and earthquakes and such ordinary things, which are taken as a matter of course in these parts.

Then came the whites, and the dance showing the coming of disease, principally performed by two stars in great bull masks, was superb and terrible. Skin diseases, colds, tuberculosis (their attempts at reproducing the commonplace cough were in themselves ghastly and tragic, for these people did not know how to cough when chest ailments first struck them)—these followed quickly the one upon the other. People died.

Then missionaries came, and schools, and in the finale the two stars performed the dance of the queer strangers taking photographs.

It was all unexpected and excellent, but, thinking back over it, a little too true. The population of Santa Ana and Santa Catalina has declined terribly.



"THE ALBATROSS DID FOLLOW, AND EVERY DAY, FOR FOOD OR PLAY, CAME TO THE MARINERS' HOLLO!"

As in Coleridge's "Ancient Mariner," albatrosses flew around the *Joseph Conrad* as it neared the Australian coast. They plunged to the water to pick up scraps of refuse but the crew held to the old sailors' belief that it is bad luck to kill one of these birds.

At last I sailed from the last of the islands, and shaped a course toward Sydney. It was about 1,700 miles, we had 1,500 done in twelve days, but then we came to the Australian coast and stopped. Fever had broken out on board, a kind of intestinal malaria, I was anxious to make port.

But the whole of the way down the Australian coast the conditions were constantly adverse, and we were more than a week on the last 200 miles. It was almost mid-December when, just as day was breaking, the pilot came aboard off Sydney Heads, and the little ship sailed in to the quarantine anchorage.

Ferries blew upon their sirens and great liners dipped, to my surprise, Sydney's

welcome was almost tumultuous. The only difficulties were to read my mail (I could never answer it) and to get some sleep. All hands were entertained royally.

We had been 131 days from Singapore, a long, difficult passage. But it had been many years since a square-rigged ship had come that way, north about, and I felt some mild pleasure that the voyage had been safely accomplished.

I was even more pleased that the whole circumnavigation was more than half over for this getting of a full-rigged ship around the earth is apt to grow difficult and wearing.

But it is a full life, a full, real life, very much worth while.

WE ESCAPE FROM MADRID

By GRETCHEN SCHWINN

STREWED cat cost mother and me a dollar a plate in Madrid

We were Americans and still had money Two aged Spaniards less fortunate watched us through the restaurant window

The dark tendon laced meat little like the rabbit for which it masqueraded was our first except horseflesh in six weeks

Audible to us as we ate rebel artillery some 20 miles away blasted slowly toward Spain's capital where the first bombs had fallen two months before

Four days later we left Madrid

A British destroyer brought us from Alicante to Marseille Now we are refugees in Genoa

The Spanish revolt was two months in the future when I a 19 year old student arrived in Madrid (page 260) Strikes frequent general long lasting marred the quiet of the city only a little

In July 1936 Jose Calvo Sotelo monarchist Deputy and Conservative leader was murdered His assassination set off the revolution

AN EMPTY AMBULANCE

I saw his body carried at night from the hospital to a pretentious government ambulance A few who knew the patient was a corpse kissed its feet as some emotional Spaniards do

Soldiers cleared a route for the vehicle Off it went siren screaming but empty I had seen the body hastily transferred to a rickety old hospital pickup car that rattled down an unguarded side street Not even in death now was there peace

That night two young Spanish army officers revolutionists deserted our boarding house By morning anti aircraft guns appeared on the roof of the Ministry of Labor opposite Streets were barricaded

Pointing to sundbag breastworks I asked Nancy in the room next to mine if she were going to school that morning

It'll be over before school's out she said

At siesta time I sat beside Nancy's bed chatting for a moment before she fell asleep

A bullet splintered the window frame whistled past my head buried itself in the wall above Nancy and sprinkled her face with plaster bits

Maybe I was wrong she said sitting up

Reckless shooting however had not yet begun on a large scale

It's mine later admitted a Ministry guard digging out the bullet Most regular soldiers are rebels I never shot a gun before I didn't mean to shoot this time But don't worry It just went off

Our first intimation of organized armed resistance to the revolt came by radio a few hours later as the Government called workers organizations—there were dozens of them—to their respective headquarters

A NIGHT BOMBARDMENT

That night the house shook No one slept Loyalist guns battered a fortified barracks inside the city the rebel headquarters By the following night it had been captured Artillery fire ceased as rebels were imprisoned (page 255)

In the poorer part of Madrid is its art loving Bohemia where I went to my classes There unrest seemed greatest There people soon began shooting their new Government issue guns—just for fun at first

One day I saw fifty men firing at cornices One hearing a shot had fancied an enemy was sniping from a roof

I went home by another street

When Loyalists began midnight raids on houses suspected of harboring rebel conspirators foreign flags appeared On our front door a posted notice certified official permission to fly American colors because two Americans lived there Special warrants were now required to search our house

Outside we wore red white and blue arm bands with the symbol U S in large letters the Embassy stamp and an identification number just in case

We dressed in our oldest plainest clothes never wearing hats One rainy day a menacing crowd forced mother to throw away a hat she had recklessly worn Our arm bands weren't enough Only aristocrats wore hats We had seen a woman stoned by girls because of her hat For a young man a mustache would have been as dangerous (pages 256 and 259)

Once-fashionable sidewalk cafes were deserted except for the militia of both sexes



Photograph from Wide World

HATLESS, BEARING THEIR OWN LUGGAGE BRITONS ARRIVE AT THEIR EMBASSY

Some of the 200 British nationals who sought refuge within the confines of their Nation's official quarters in Madrid when the siege of the Spanish capital began pass through iron gates guarded by Loyalist soldiers in overall uniforms. A few refugees camped in the gardens surrounding these buildings. Many Americans found haven in their own Embassy which was kept open until Thanksgiving Day when the efficient *Chargé d'Affaires* Eric C. Wendelin officially closed it and transported 73 refugees by motorcar to Valencia.

recognizable by distinctive uniforms, overalls!

Pedestrians were few, cars were plentiful. Commandeered private automobiles were unceremoniously issued to defending recruits who seemed never to have driven before. Cars like guns, were fascinating new playthings.

I often saw 15 or 20 militia, all armed, in five passenger cars lunging through unpoliced intersections. When one inexperienced hand held a steering wheel and the other a pistol, accidents were certain. I saw three resulting fatalities in a week.

PAINTINGS, RUGS, AND SILVERWARE STORED IN A PALACE

Every night fleets of canvas covered army trucks rumbled past my window. Hours later they returned. In the courtyard of an old palace near by I watched precious cargoes unloaded—paintings, oriental rugs, silverware—until the enclosure might have been an unroofed Aladdin's cave.

I saw a barrel carried into the palace basement. Rumor called it dynamite. A fuse, they said, was ready if Madrid fell. If rebels lost, then Loyalists would divide confiscated heirlooms of insurgent aristocracy.

All seats one price, first come, first choice' was a new policy of Government controlled cinemas.

In the Capitol Theater we saw 'The Festival of the Dove' a popular, well produced Spanish picture. Our seats the best, cost 35 cents. Normally 2,000 people crowded into the theater particularly into the cheaper sections. Now a handful of patrons occupied loges.

Afterward we were stranded for an hour in the foyer until a few squads of militia had spent their ammunition in apparently aimless street shooting.

News was scarce, rumor was plentiful. Madrid newspapers and radio broadcasts were naturally pro Government. Loyalist successes were magnified and rebel gains minimized.



IT LOOKED LIKE A SIT DOWN WAR

Photograph from Acme

The first frost of winter joined hands with the Loyalist forces defending the capital and rebel soldiers had to forage for fuel. Here a group of the insurgents are gathered around a campfire behind their lines. Chairs and scraps of lumber serve as kindling. In the left background rises a sandbag redoubt commanding a street intersection leading to Carabanchel, a suburb of Madrid on the road to Toledo.

A new decree required every radio owner to amplify his instrument enough to permit street patrols to hear it. Listening to foreign stations was forbidden.

One evening Eduardo Rocafort failed to come to dinner. Apprehensive and solemn we ate little. Perhaps our happy go-lucky haberdasher had disappeared. We breakfasted even more sadly. Rocafort had not returned. Most of us had not slept.

He was nice, murmured Nancy as she shared a little can of cherished sardines with me. I liked him, she added, and I winced at her use of the past tense.

Just then haggard but cheerful Rocafort reappeared. Some of us kissed him.

CHECKS PAYABLE ARE

The revolution was then three weeks old. Our friend like other merchants had been asked to exchange his goods for a peculiar form of money. Newly recruited militia men in lieu of other pay had been supplied with sheaves of what were almost blank checks on the Loyalist Government payable after the revolution.

They looked to me typewritten many copies at a time and each rubber stamped with a Government seal. When a defender of the capital needed a silk handkerchief or a cigarette case he could peel a note from his roll, fill in the date and the amount, sign it, hand it to the clerk and pocket his purchase.

Rocafort's stock had dwindled fast. At last he quit accepting this currency. But this was defiance. He was marched to the headquarters of the Proletariat Brothers.

One of my captors looked like a nice fellow. I knew he wouldn't shoot me, explained the haberdasher. But the other—well, I was afraid he might. At headquarters they gave me what American cinemas call the third degree. One fellow kept waving a gun at my head. I remembered the guard who'd accidentally shot into Nancy's room.

They thought I had no confidence in the Government. One of my inquisitors thought me a conspirator. But I guess to the rest I looked too simple for that.

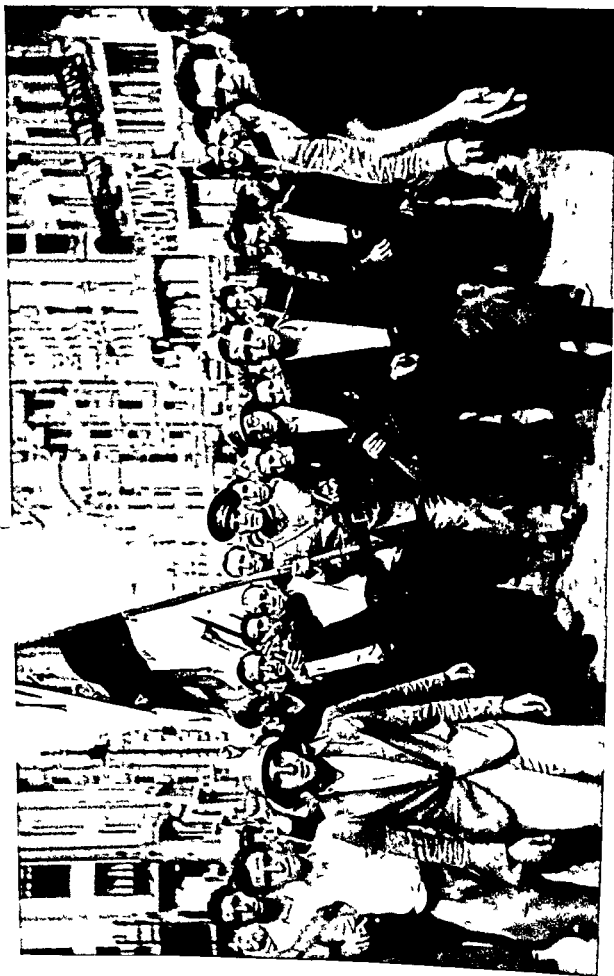
After a few hours they got hungry and



"DEATH FROM THE SKIES" DID NOT ALWAYS MEAN BOMBING PLANES

Photograph from Wide World

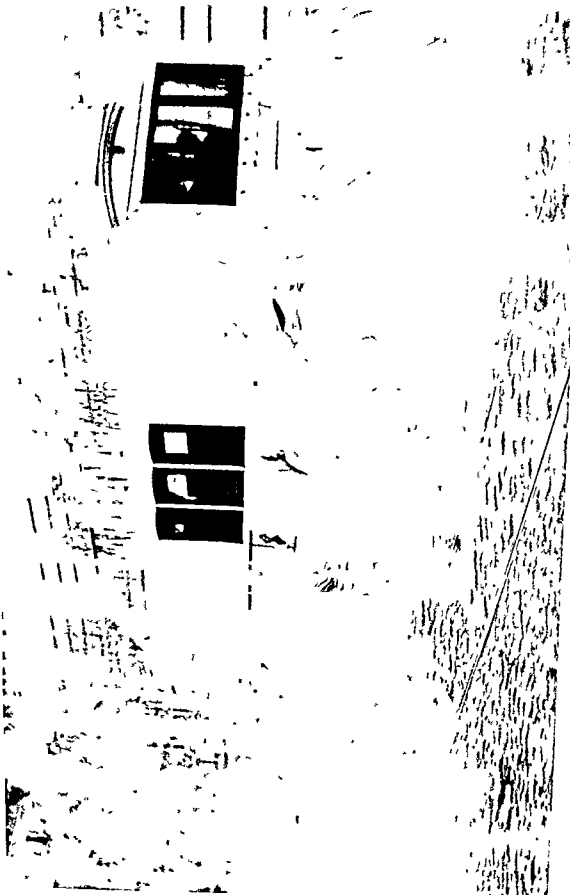
During the sporadic street fighting that marked the early stages of the revolution Loyalist riflemen and machine gunners quickly chose places of vantage on the roofs of buildings throughout the Spanish capital. Women (right) as well as men many of whom had never before handled firearms crouched behind cornices and parapets shooting wildly at anyone in sight. Stray bullets caused scores of casualties (page 251)



SINGING AND CHEERING, LOYALISTS RETURN IN TRIUMPH FROM A RAID ON THE MONTAÑA BARRACKS

When early in the Spanish Civil War rebel officers seized the military barracks in Madrid Loyalist gunfire shook the city until these strongholds surrendered. At the big Montana Barracks near the North Station groups of workers captured the guns, bayonets, banners and helmets displayed here. This Republican flag, which flew over the barracks during the fighting, was carried by the officer to the Ministry of the Interior and hoisted from the central balcony.

Hot graph from Wile-Wild



STREETCARS LIKE TOONERVILLE TROLLEYS WERE PRESSED INTO SERVICE BY RESIDENTS FLEEING THE MADRID HOLOCAUST
Warmly dressed men and hatless women, young and old, crowd about the entrance to an already overloaded trolley that will take them as far as the city limits with their meager belongings. Streetcar service on many lines was suspended when aerial bombs tore up tracks and leveled wires

1 photograph from Acme



THE HAVOC OF AERIAL BOMBS IS REVEALED IN THIS DEBRIS STREWN CORNER OF THE PUERTA DEL SOL, THE "TINI'S SQUARE" OF MADRID. Paving blocks, streetcar rail, subway entrance curbstones and shop fronts were smashed and scattered as if by a giant's hand after a rebel war bird had laid its eggs.

Ph. telegraph from Wide World



A photograph from Wide World

CHILDREN DO THEIR BIT BY MODELING IN MUD

Members of a youth organization called "Pioneros" outline the emblems of various Loyalist groups to collect funds for the International Red Relief. Conspicuous is the Soviet five pointed star and crossed sickle and hammer. Their sidewalk 'billboard' is in the Cuatro Caminos district, later the scene of terrific fighting between rebels and Loyalists seeking possession of this northern suburb of Madrid.

let me share in a banquet—meat, eggs, potatoes and coffee. Wine seemed to mellow them. The tough looking fellow apologized to me. 'I'm not as bad as I look,' he said. 'I'd hoped you weren't,' I replied, laughing with him.

The proletarian salute—a clenched fist held high—was obligatory, but not, I thought, for foreigners (page 265). One day when I failed to reply to a militiaman's salute, he slowly unsheathed and lowered his revolver. I became a conformist.

HORSE MEAT DEARER THAN FISH

Food except starches, grew scarcer. It was sold at high prices, only a little at a time. Like a dozen tramps foraging for the ingredients of mulligan stew, my fellow boarders straggled in before mealtimes, each with a contribution. Sometimes one found a can of milk, another a little coffee, a third carrots—we had plenty of them—and still another had purchased a fat river fish.

There already was a race between the Government and civilians for custody of

staple foodstuffs. Most shopkeepers favored civilians. We paid cash, plenty of it. Fish was a dollar a pound, horse meat was half again as much.

The first serious bombardment occurred about midnight. Mother and I were on the Paseo de la Castellana, once a show place, now deserted. Sweethearts no longer strolled beneath the spreading trees. It seemed wider than ever in its desolation.

An airplane suddenly roared earthward. A blinding flash threw into sharp relief the branches of the trees along the barren street. Then an explosion, little more than a block away, shook the pavement as if an earthquake were in progress.

We hiked for home, our skirts waist high. Bombing continued all night. The tar got seemed to be the Ministry of War, two blocks away.

Of the numerous foreigners then in Madrid, only a fraction remained after that night. We were among them. My friends paid well for train tickets auctioned off at the station by foresighted militia who had purchased them beforehand.



Photograph from W de W o l d

MODERN AMAZONS RECEIVE A HASTY FIREARMS LESSON

Wearing cotton house dresses and blouses and shoes with high heels Loyalist women and their newly issued rifles rushed to the defense of Madrid In the revolution torn capital a forage or overseas cap was the only safe headgear for women One rainy day a menacing crowd forced the author's mother to throw away her hat because such head covering was considered a symbol of aristocracy For a young man a mustache would have been as dangerous (page 251)

Our American friends sat on their baggage in the aisle of a crowded train and arrived at Alicante we learned later in time to catch the last American war vessel to evacuate refugees to Marseille

Street lamps were painted a ghastly blue so were auto and streetcar headlights to be less visible from the air But they intensified the pallor of many an already drawn and frightened face

WATER HOARDED IN BATHTUBS

Henceforward we barred our entrances at ten and lest water mains be broken insured ourselves a supply of drinking water by keeping bathtubs full We boiled every drop we drank which seemed a whimsical procedure to our servants

One night I heard a racket downstairs I crept down with a candle—lights went out at 10 30—and discovered my Spanish friend Carmen pounding on the big grilled front door I unbarred it and let her in

They've taken our house for a barracks I left with mother by the back door as

soldiers entered the front We left only Felipe!

I found them a place to sleep

Two days later Felipe brought some of their clothes

Our house can never be the same! he said describing barrack life in the mansion where long service had given him a certain proprietorship

There aren't enough ashtrays so they use the floor he continued sadly Rugs and tapestries become bedding They toss things to one another and if they've been drinking their aim is bad Many mirrors are broken One fellow was feinting with his sword The blade slipped and cut the Goya Believing the painting ruined he tore it from the frame and threw it in the grate where some of your father's books are usually burning

Fighting men—and these were unlettered untrained and undisciplined—have little time for the finer things of life Such things must be in wartime but I felt only little less sorrow than Carmen for I, too, loved her fine old house

Photograph of leaves

Gretchen Amelia Schwinn



JUST A PICTURE, BUT WITHOUT IT NO ESCAPE FROM
WAR TORN SPAIN

At Alicante police and immigration officials stamped the author's passport and then it was carefully scrutinized by workers groups many of whom could not read. Gretchen Schwinn born in California began taking lessons in interpretive dancing when she was five years old. Last year she went to Madrid to continue her studies under a famous Spanish master. She remained in the capital until the siege compelled her to seek safety in Italy.

One day I found five cans of milk in an out-of-the-way store. Who could know that such a little shop in so poor a district, still contained such treasure?

Yes I could buy them with a certificate from our building porter that five adults lived together. I raced home for it. An hour later I returned. The milk was gone.

One night a woman, a stranger, took refuge with us. The next afternoon she left then returned with police for she was in the Government intelligence department

and had reported a rebel sympathizer. The suspect, absent as officers arrived, returned while the house was being searched.

'They're looking for you,' warned the friendly porter, but he spoke too loudly. The woman heard him as the quarry vanished. Yet she did not inform on the porter, and I wondered why.

'If the rebels enter Madrid, shall I need friends,' was Nancy's explanation.

That night Lola was discharged for fighting with Paulina, her fellow maid. At the police station Lola reported Paulina a rebel. Again the police came.

This time their search was stricter. A guard herded us into a front room. He wore a uniform—overalls and a militia cap with a red tassel. A

scarlet rag tied to his arm bore police insignia. From his shoulder hung a cartridge belt and from his lower lip a cigarette. Frequently he aimed his revolver at each of us to show us he meant business.

We were relieved when his two comrades returned but only for a moment. They waved a bit of paper with a look that said: 'We thought so!'

Musical Antonio had clipped and saved newspaper programs of a Madrid orchestra he hoped one day to join. On the back of

one pre-revolutionary program were names of members of an organization that since had joined the rebels

Paulina they questioned and released Antonio they took away. He did not return. We had been a long time realizing how serious the civil war had become.

CACHE OF BURIED CARROTS

We had a daily meal, regularly, of rice, beans, or spaghetti. Of carrots there was a good supply. Someone had once told me they kept almost indefinitely in the ground, so we had filled a box with moist earth and could always produce a fresh one.

By day we still went walking, and often saw squads of Loyalist rookies being drilled in the streets by officers who seemed little more than recruits themselves.

Learning squad maneuvers was especially difficult for the peasants, so recently from the fields that they still wore their loose canvas topped, hempen soled shoes (pages 255 and 265).

And if at last a group of them seemed about to execute a perfect about face, ranks would break and soldiers scatter at the approach of a rumbling cart or an envied comrade in a commandeered car.

Our unaccustomed diet soon affected our health. We fell easy victims of an influ-



Photograph from Wide World

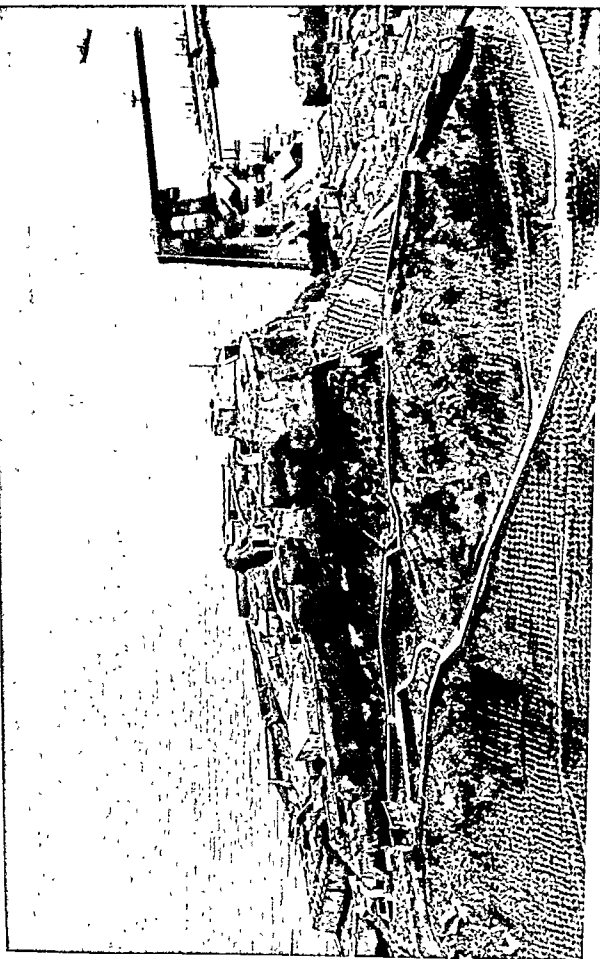
WHEN NOT FLEEING BOMBS OR FIGHTING FIRES, ALL MADRID PARADES

This procession of youth is campaigning for money for Loyalist hospitals. On the placard is the portrait of La Pasionaria, nickname for Deputy Dolores Ibarruri, a famous woman radical leader of the Government forces. She suggests a combination of Joan of Arc and the knitting women of the French Revolution.

enza epidemic that swept the city just as it had during the time of the World War.

One day Mateo burst into the room where I lay ill, shut and locked the door, then triumphantly exhibited a small package.

'It's for the invalid,' he said, gayly, as he unwrapped the contents, perhaps a pound of ham! We cut it into small bits and ate it leisurely, enjoying every morsel as much as I ever enjoyed cake frosting when I was much younger.



Photograph by Flaudlin

TO BE SURE THEY WERE CONCEALING NO MONEY, THE AUTHOR AND HER MOTHER WERE DISROBED BY CUSTOMS INSPECTORS HERE. But luckily, the Spanish militiamen who completely undressed the two Americans did not find a roll of traveler's checks hidden in the author's hair. She had been warned that such checks would be torn up by the zealous officials, following strictly the law that only \$50 could be taken out of Spain (page 266). The frowning bastions of the Castillo de Santa Barbara overlook the moles and modern harbor of Alicante.



Photograph by Flanahan

THOUSANDS OF FORTIFIED REFUGES HAVE BEEN EVACUATED THROUGH BUSY BARCELONA

From a port of the British destroyer fleet, Spain's largest city and most important seaport seemed to the quiet of early morning with a few dark lights in the streets. The harbor however was ominously full of foreign vessels the German ships being particularly conspicuous by their lack of light. From Barcelona many factories have produced munitions and other supplies for the German forces at the front.



Photograph from W. de World

NEWLY RECRUITED MILITIA LEADERS, WITHOUT ARMS OR UNIFORMS PARADE IN MADRID

Because many of the regular soldiers of the Republic went over to the rebels early in the Revolution forces for the defense of the Spanish capital had to be drawn largely from labor unions and various youth organizations. Overalls, smocks, berets, cockney caps, *apargatas* (hempen soled sandals), and broad sashes lend informal touches to a grim and determined group that later checked rebel forces at the very gates of the city. One of the marchers (lower right) gives the clenched fist salute of the Loyalists.

How Mateo got the ham he never said. Before I was ill, he had not been out of the house for six weeks and had hidden safely while it was searched, for he was known to have had rebel sympathies.

Like two conspirators, we erased all traces of our little feast.

Our fevers continued. Nevertheless I would have stayed in Madrid, but mother insisted on packing. We went to the British Consulate (page 252), the last American warship having departed.

Our passports were inspected closely, then verified by a telephone call to American consular officials. We learned there had been more than 100 cases of forged passports.

We were to leave Spain on a British battleship.

Taxis and transfer trucks were serving at the front. The coal man took our trunks to the station on his rickshaw like handcart. Baggage was inspected and questions asked at the train.

"You don't look like foreigners to me," said the inspector.

"But we are," I insisted. "We're Americans."

"Then why are you afraid?"

"We aren't afraid!" I answered emphatically.

"If you aren't afraid, was his next question, then why are you leaving Madrid?"

My explanation that conditions were not conducive to study satisfied him, apparently, and after settling us for the night he even asked a compartmentful of soldiers next door, to help us.

Although we had been assured that foreign checks drawn on funds on deposit abroad were permitted to leave Madrid we had learned that many travelers' checks had been torn up in Alicante (page 263) by zealous officials who followed strictly the law that no more than \$50 could be withdrawn from Spain by a departing foreigner.

FUNDS CONCEALED IN HAIR

I carried our travelers' checks rolled tightly, hid in a knot of hair at the back of my head.

Representatives of the British Consulate and H.M.S. *Despatch* met us at the train.

At once no opinions warned the Britishers, or you may be detained. Say nothing of the revolution. Intelligence men are everywhere."

Passes were issued by police and emigration authorities were my "clients." It was

also necessary to secure the approval of representatives of the groups of workers who made up the Loyalist Government. Though I had the feeling that many of the inspectors could not read English, both we and our passports were scrutinized long and carefully.

Everything we carried was studied. Several inspectors worked from 4 o'clock until 6:30 examining our luggage, two trunks and three bags. Every sleeve, pocket, hem, shoe and stocking was investigated. A hundred pieces of music were unfolded, one by one.

"This prayer book is forbidden," said an examiner, holding up a worn little volume without a cover, my French-English dictionary.

"All right, take it," I said, saving my arguments for better times.

Our baggage passed we were "frisked" more personally by women who completely disrobed us. One militiaman examined and admired my earrings. She was dangerously near my hairknotful of travelers' checks. I gave her the earrings with a smile.

Again we were questioned by the men in charge. One asked if I had any American cigarettes. I gave him one of the cigars I carried for tipping purposes. Then I had to explain myself to the amazed Englishmen.

It was nearly seven when we appeared at last before the man who seemed to be in highest authority.

"You have little money, not even the allowed fifty dollars," he said, glancing at our reports. "You must have had more. Where is it?"

"We spent it," I said.

"On what?" he asked suspiciously.

"Oh, clothes and gifts," I answered lightly, and this watch.

"Is it gold?"

"No," I said truthfully, though the watch was quite good.

"How do you expect to live?"

"Oh, I improvised easily," I have a rich uncle in Marseille.

A little motorboat took us to the *Despatch*, where all the officers—at least it seemed so—and five other refugees were on the deck to greet us.

Dinner was waiting in the messroom. I'm afraid I made a pig of myself, particularly with the meat and butter, but there seemed to be plenty.

After had been in the hall of addressing post, called to me in English about people who could not understand that lan-



Photograph from Wide World

INNOCENT SUFFERERS IN A WAR THAT KNOWS NO QUARTER

Volunteer Government workers dole out the meager rations that can be spared for children whose fathers and in some cases mothers are at the front fighting to stem the rebel advance. Later when Spanish mothers learned that Madrid's tallest building, a skyscraper built by an American owned telephone company, had successfully resisted aerial bombs, they flocked there with their children. Given biscuits and milk they asked timidly about the cost, but were told that the company would foot all bills.

guage. Now she could not realize we were on a British boat—that the sailors here understood English as well as we did.

"This waiter, she said, would have done well in Utah a few years back.

And why in Utah?" asked the handsome, athletic looking seaman.

Mother, speechless now, started to blush.

She always thinks of a sailor as an old salt, I said, a bit slowly, "and out in Utah is a big old salt lake where a sailor, you see, could really be even more of an old salt, couldn't he?"

"I suppose so, ma'am," replied the seaman courteously, while one of his mates, I observed, smothered a guffaw.

With darkness the *Despatch* raised anchor and proceeded outside the harbor, lest the port be bombed during the night. We were snug and comfortable in a cabin given up by an officer.

In the morning we returned to Alicante

I was vaccinated for smallpox, as the rules required, by the ship's doctor. He laughed when I asked him to put the scar where it wouldn't show. The sickroom was the whitest, neatest place, with two rows of enameled bunks and compact but efficient-looking medical equipment. There was one lonesome patient.

That morning the seamen unloaded five tons of food for the British Embassy in Madrid. The *Despatch*, I was told, carried six months' supply.

ATTENTION! SALUTE!—FOR THE REFUGEES

The faster destroyer *Antelope* entered the harbor and came alongside us. That was the boat that would take us from Spain. As we walked down the gangplank of the *Despatch*, most of the officers and men stood at attention and saluted. We were only a handful of refugees, but I felt for a moment like a little girl in a fairy story.

Argentine and Italian destroyers dipped their flags as we steamed slowly out of the harbor. Their sailors stood at attention. Eight seamen on each of two German boats marched forward and presented arms. The old fort on the hill was almost beautiful in the autumn sunlight. How could all these things be for so grim a purpose?

Our seamen watched two men who carried diplomatic passports from another country, fearful lest they be bent on sabotage. "They know boats," I overheard one Cockney sailor say. "Hit's huncanny the way they climbed them ladders."

We sat in deck chairs under a tarpaulin, beneath the muzzles of two heavy guns that were primed and manned. The narrow *Antelope* closely resembled a Spanish rebel destroyer. Already she had been shelled, but without effect.

Propeller spray flew high above the stern. I commented to the engineer on our speed of 29 knots.

"We can do 35!" he said, contemptuous of the present rate. "We're using only two boilers."

Yet, despite steam boiler economy, evacuating refugees was expensive. It cost, they said, nearly \$4,000 for the run from Barcelona to Marseille, and we had come from Alicante, more than twice as far.

I shall always feel nearly a thousand dollars in debt to the British Treasury, especially when I remember the butter I ate!

CRETONNE CURTAINS ON A WARSHIP

When it grew chilly on deck, we sat in the officers' mess, small, but ever so cozy, with big leather armchairs, benches along the walls, a case of books, smoking table, and even a polished little coal stove.

We dined there, too, but so small it was that its rightful occupants, the officers, waited until we had finished. Bully beef, soup, salad, butter, cheese, and coffee was our second real meal in three months.

We chatted afterward with the officers. All seemed young, even the captain, and I'm sure the chief officers were not more than 28 years or so. We cramped them terribly and upset their routine, but they were charming hosts.

That night, with some of the other women I slept on one of the benches. When I awakened at five, the engineer let me wash in his compact little cabin. Every bit of space was utilized, yet there were many conveniences and a place for every-

thing. Cretonne curtains—I never imagined them on a warship—gave the quarters a homey look.

I peered from a porthole as we entered the harbor of Barcelona—ever so peaceful in the quiet of early morning, with a few starlike lights marking the streets. The harbor, however, was full of war boats. I could distinguish the German ones, because they were black (page 264).

We drew near a ship which I guessed was British, for a rowboat was silently lowered from it and rowed toward us. A sailor handed a package to someone on our deck. It all seemed so mysterious in the graving dawn of a war-torn land. Later I learned it was only the ship's mail for Marseille.

From Barcelona we skirted the coast.

"Returning, we'll come direct," said the engineer, "but the water is rougher that way. We don't want our passengers sea sick."

The Cuban woman *did* get sick, and my odddest memory of the *Antelope* is that of an unusually large and tanned sailor, walking up and down the deck, between the guns, singing lullabies to her baby.

Formalities at Marseille were brief. Consular representatives met the refugees. We didn't have a cent—not even a Spanish one—for I had given away the last of our cash. An American attaché lent us 60 francs until I could cash a travelers' check rumbled from long hiding in my hair.

Now we are in Genoa, living in a house with many other refugees from Spain—all Spanish save ourselves.

A mother and her four small children are fellow guests of mine. She left Barcelona early, before searching was so strict and so personal, and brought a few valuable jewels hidden in her corset. She wears them now, but one after another disappears.

"Mañana," says she, "the war is over. Yet I am worried about my husband. He is still in Barcelona."

After many anxious days there came a letter. It contained only a scrap from a newspaper—a clipping with torn corners. She smiled, called her children, and handed me the printed bit.

It was the death notice of her husband.

"He's alive, and safe!" she said, laughing at my amazement. "He plans to escape under another name. If they think him dead, it is easier. He arranged for his obituary, and tore the clipping just so, himself!"

SPEND A FASCINATING MONTH IN



A vigorous young nation below the Equator. An island continent large as the United States under the Southern Cross. Where summer blooms while the Northern Hemisphere is blanketed in snow and the balmy winter season comes in June July August.

Australia is easy to reach. Splendid travel facilities unite this land of progress play and peace. Fast rail ways offer special tourist rates. And Hawaii Samoa Fiji New Zealand en route. Exchange favors dollar.

To really see Australia plan to stay a month!

Details from your Travel Agents or address

AUSTRALIAN NATIONAL TRAVEL ASSOCIATION

(A non profit Community Organization)

Suite 300A Hotel Clark, Los Angeles California

For NEW Travel Thrills



Try SOUTH AFRICA

SUNNY and invigorating South Africa offers high travel adventure, thrillingly interesting sights, comfortable transportation and delightful hospitality!

Gay seaside resorts—charming country clubs—sporty fishing—picturesque Bantu life with its primitive customs and tribal ceremonies—and always the alluring mystery and romance of Africa!

Visit Kimberley, where only seventy years ago on the banks of the Vaal River the first diamond in South Africa was discovered. Johannesburg "City of Gold" with its mines more than a mile and a half deep!

Once in South Africa the choice of adventure is yours!

DETAILED INFORMATION FROM ALL LEADING TOURIST AND TRAVEL AGENCIES



TRAVEL IN COMFORT WITH MELLON TRAVELERS CHEQUES

Travelers cheques are universally recognized as the safest and most convenient means of carrying expense money. Mellon Travelers Cheques are known and accepted everywhere. They can be used directly in payment of any item of expense or can be exchanged for currency in any country. Ask for them at your own bank.

MELLON NATIONAL BANK PITTSBURGH

MEMBER

FEDERAL DEPOSIT INSURANCE CORPORATION

Flooded With Semi-Tropical Sunshine!

FEBRUARY MARCH and APRIL are

Glorious "OUTDOOR" MONTHS

Why tolerate cold, inactive "indoor days" when (for surprisingly low vacation cost) you could be enjoying, right now, the exhilarating outdoor life which makes the glamorous California resort city a foremost mecca for winter vacationists. Sparkling sunbath, palm, flowers, golden beaches, warm blue sea entrancing day and night under balmy skies. Golf sailing deep-sea fishing, horseback riding, countless sports and amusements. All await you—Come!



LONG BEACH

SOUTHERN CALIFORNIA

THE BECKONERS Long Beach, California U.S.A. Please send free booklet.

Name

Address

City

PLEASURE PORT OF THE PACIFIC



HOW MUCH DOES THE TELEPHONE ^{SAVE}~~COST~~?

It is easy to figure how much the telephone costs. It is not easy to reckon how much it saves.

A single telephone call may save a life—brighten a friendship or a day—sell a bill of goods or land a job.

One telephone call may be worth more to you than the cost of the service for months and years to come.

The telephone saves you priceless hours of time each week—spares you trips through snow and storm these uncertain winter days.

Without moving from the warmth and comfort of your own fireside, you are in

touch with stores and friends and office—by telephone. The cost is but a few cents a day. In return, the telephone offers you increasing measure of security, convenience, happiness and achievement.

Every time you call a number, you use some part of a nation-wide telephone system that cost more than five billion dollars to build and employs about 300,000 people. The facilities of this entire organization are yours to command—anywhere, and at small cost.



BELL TELEPHONE SYSTEM

THE NATIONAL GEOGRAPHIC MAGAZINE

MARCH, 1937

TWENTY FOUR PAGES OF ILLUSTRATIONS IN FULL COLOR

Imperial Rome Reborn

With 34 Illustrations

JOHN PATRIC

Caesar's City Today

21 Natural Color Photographs BERNARD F ROGERS JR

Crater Lake and Yosemite

With 7 Illustrations and
13 Paintings

WALLACE W ATWOOD JR
EUGENE KINGMAN

First Color Photograph from the Stratosphere

ALBERT W STEVENS

Time's Footprints in Tunisian Sands

With 43 Illustrations and 2 Maps

MAYNARD OWEN WILLIAMS

The Mexican Indian Flying Pole Dance

With 13 Illustrations

HELGA LARSEN

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
WASHINGTON, D.C.

\$3.50 A YEAR

50c THE COPY

NATIONAL GEOGRAPHIC SOCIETY

GEOGRAPHIC ADMINISTRATION BUILDINGS

SIXTEENTH AND M STREETS NORTHWEST, WASHINGTON, D. C.

GILBERT GROSVENOR, President

ROBERT V. FLEMING, Treasurer

HERBERT A. POOLE, Assistant Treasurer

FREDERICK V. COVILLE, Chairman Committee on Research

JOHN OLIVER LA GORCE, Vice President

GEORGE W. HUTCHISON, Secretary

THOMAS W. MCKENNA, Assistant Secretary

EXECUTIVE STAFF OF THE NATIONAL GEOGRAPHIC MAGAZINE

GILBERT GROSVENOR, EDITOR

JOHN OLIVER LA GORCE, Associate Editor

J. R. HILDEBRAND

Assistant Editor

MELVILLE BELL GROSVENOR

Assistant Editor

McFALL KERBEY

Chief of School Service

LEO A. BORAH

Editorial Staff

FREDERICK SIMPICH

Assistant Editor

ALBERT H. BUMSTEAD

Chief Cartographer

E. JOHN LONG

Editorial Staff

FRANKLIN L. FISHER

Chief Illustrations Division

MAYNARD OWEN WILLIAMS

Chief Foreign Editorial Staff

CHARLES MARTIN

Chief Photographic Laboratory

LEONARD C. ROY

Editorial Staff

BOARD OF TRUSTEES

ROBERT V. FLEMING

President and Chairman of the Board, Ruggs National Bank

WALTER S. GIFFORD

President American Telephone and Telegraph Co.

DAVID FAIRCHILD

Special Agricultural Explorer U. S. Department of Agriculture

C. HART MERRIAM

Member National Academy of Sciences

LYMAN J. BRIGGS

Director National Bureau of Standards

GEORGE R. PUTNAM

Commissioner of Lighthouses Retired

THEODORE W. NOYES

Editor of The Evening Star

GEORGE W. HUTCHISON

Secretary National Geographic Society

CHARLES EVANS HUGHES

Chief Justice of the United States

WILLIAM V. PRATT

Rear Admiral U. S. Navy, Retired

RAYMOND S. PATTON

Rear Admiral Director U. S. Coast and Geodetic Survey

ALEXANDER WETMORE

Assistant Secretary, Smithsonian Institution

GILBERT GROSVENOR

Editor of National Geographic Magazine

J. HOWARD GORE

Prof. Emeritus Mathematics The George Washington University

FREDERICK V. COVILLE

Botanist, U. S. Department of Agriculture

ELISHA HANSON

Lawyer and Naturalist

JOHN J. PERSHING

General of the Armies of the United States

GEORGE OTIS SMITH

Formerly Director U. S. Geological Survey

O. H. TITTMANN

Formerly Superintendent U. S. Coast and Geodetic Survey

JOHN OLIVER LA GORCE

Associate Editor of the National Geographic Magazine

CHARLES G. DAWES

Formerly Vice-President of the United States

GEORGE SHIRAS, 3d

Formerly Member U. S. Congress Faunal Naturalist and Wild Game Photographer

OSCAR WESTOVER

Major General, Chief, U. S. Army Air Corps

CHARLES F. LETERING

President General Motors Research Corporation

ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

To carry out the purposes for which it was founded forty nine years ago the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material which The Magazine can use, generous remuneration is made. Contributions should be accompanied by addressed return envelope and postage.

Immediately after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—The Valley of Ten Thousand Smokes—a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

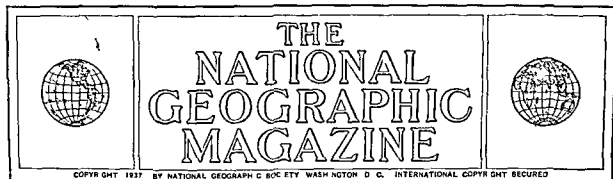
The Society cooperated with Dr. William Beebe in a deep-sea exploration of undersea life off Bermuda, during which a world record depth of 3,028 feet was attained August 15, 1934, enabling observations of hitherto unknown submarine creatures.

The Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole, and contributed \$100,000 to Admiral Byrd's Antarctic Expeditions.

The Society granted \$25,000 and in addition \$75,000 was given by individual members to the Government under the congressional appropriation for the purpose was insufficient and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

The Society's notable expeditions to New Mexico have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region, The Society's researches have solved secrets that have puzzled historians for three hundred years. The Society is sponsoring an ornithological survey of Venezuela.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to an officially recognized altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.



IMPERIAL ROME REBORN

By JOHN PATRIC

I STOOD under Benito Mussolini's office window after Addis Ababa fell. I saw him throw up his strong right arm and say, slowly and distinctly 'The war is finished!'

The Roman Empire was reborn that night. Later it was named, 'L'Impero Italiano,' yet Romans rule it as surely as their fathers from the near by Forum ruled most of the world they knew.

Empires have fallen. This one—and this one alone—has risen again.

More than 26 centuries ago the wolf suckled twins quarreled and Remus was slain for leaping scornfully over the wall of Romulus' new town. Far from having beer lult in a day, the Eternal City is unfinished even now and to her seven hills more and finer roads than ever lead from far places.

One day I had been with newspaper folk in the reclaimed Pontine Marshes near Rome*. As we lunched informally with Il Duce in a little Littoria restaurant, I learned upon what meat this modern Caesar feeds.

Mussolini talked some, listened most, and smiled often, rolling his eyes so much that my strongest memory now is a continual sight of their whites.

Above one close-clipped, iron gray temple a large mole added homely character to his nearly bald head. Tucking a napkin protectively beneath his black collar, he ate with quick, nervous motions—bread,

noodles, cheese, pork and peas, an orange, and drank a little Frascati wine.

DICTATOR SILENCES AUTO HORNS

Tell us about the auto horns,' someone asked.

'One day,' replied Il Duce in Italian, of which I caught an occasional word, Rome seemed too noisy. I called the police chief. Make no decree, but when you hear a horn and catch the driver's eye do this!'

Finger to lips, Il Duce said, 'S s sh!'

'In two hours the city was silent,' he added, like a proud father of obedient children.

Motorists in Rome may lean from car windows and shout or whistle at unwary pedestrians. Taxi men have encouraged brakes to squeal. Automobile horn blowing is forbidden.

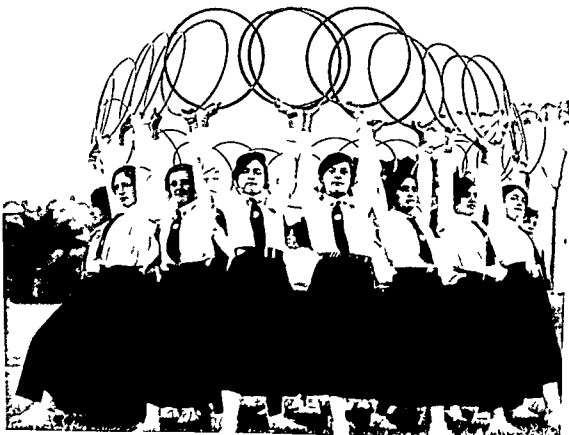
He shook hands genially with us, and then, seeing the crowd in Littoria's public square, gave us more showmanship. He threw back his shoulders, lifted his chin, and strode between police lines so rapidly that followers trotted.

Had there been in Littoria the gay girls in bright provincial costume who had waited on the site of Aprilia, newest of the Pontine towns, he would have paused to kiss them.

Anciently, many of these marshes were farmed. Through them, over the Appian Way to Rome, came loads of grain to be distributed by Caesar's lavish hand.

Circe's mountain—visible from its top is St. Peter's in Rome—still stands southern sentinel over the former home of ducks, wild pigs, and malarial mosquitoes.

* See 'Redemption of the Pontine Marshes' by Gelasio Caetani in THE NATIONAL GEOGRAPHIC MAGAZINE for August 1934.



Photograph by Acme

'HOOP LA' KEEPS ITALIAN GIRLS BOTH SHAPELY AND IN SHAPE

Group athletics for the feminine Fascist are balanced by courses in domestic science languages horticulture applied arts and other subjects selected by the individual

In the uniformly built four year-old farmhouses of this made-over littoral I expected to find modernity. They are almost as simple, except for screened windows as the homes, unchanged by centuries, in the surrounding hills (page 318)

Farmers' wives wash clothes in the yard with hand pumped well water, and bake in outdoor ovens preheated by twig fires uninterrupted by jangling telephones. I saw neither electric wires nor radio aerials. What appear to be garages with arched entrances off ground floor kitchens are well kept stables for plow oxen and cows.

We like them near—yes in the house said a farmer. 'If they need us we are at hand.

In the Middle Ages, when this farmland had reverted to marshes fewer than 30 000 people remained in Rome.

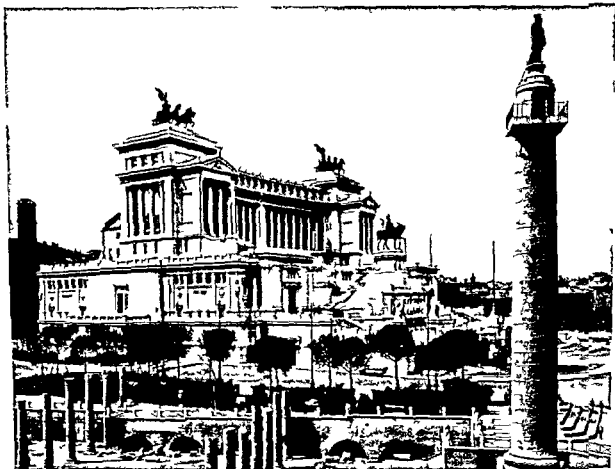
Increase was eightfold by 1870, the year Italy was unified. In the next 30 years the population nearly doubled to 462 743. In 1925 three years after the Fascist revolution, the figure was 767,983.

Today the capital is Italy's largest city, with more than 1,130 000 people. That ancient granary, and many another, is needed again.

Rome has virtually no industries; they are discouraged. Commerce on the silt filled Tiber is almost impossible. Italy's population is a third that of the United States. In the last 75 years, her increase rate has been a fraction of ours, yet her capital has grown more than twice as fast as Washington D. C. and at the time of the last official census, was more than double its size.

These figures tell of a central government growing in power. They explain why modernity has come suddenly, if incompletely, to venerable Rome, and touched so lightly much of the Italy I was later to see. They speak eloquently of tax gatherers' harvests pouring from afar as of old making Rome rich again.

Next day I dined more humbly in a *trattoria*. These old fashioned little dining rooms are to Rome what a 'Dad's Lunch,'



Photograph courtesy ENIT

AMONG THE BONES OF OLD ROME RISES THE SYMBOL OF THE NEW ITALY UNITED

The huge white marble National Monument to Victor Emmanuel II unveiled in 1911 faces the Foro Italico and the Piazza Venezia. Adjacent lie excavated ruins of the ancient city. Like a misplaced lighthouse Trajan's Column right towers above the once imposing Forum of Trajan. The tall shaft built of Parian marble is decorated with a continuous spiral band of scenes in relief sculpture of the emperor's wars with the Dacians.

patronized for good food and low prices, not style is to the average American city.

GLADIATORS CAFE RETAINS OLD ATMOSPHERE

There shuffled from the street a wrinkled old violinist. He seemed to play even more for love of it than for the battered coppers worth about a cent every diner gave him—even the gnome-like little man who had brought his own bread and cheese and ordered only wine. The poorer the Italian the more generous he seems.

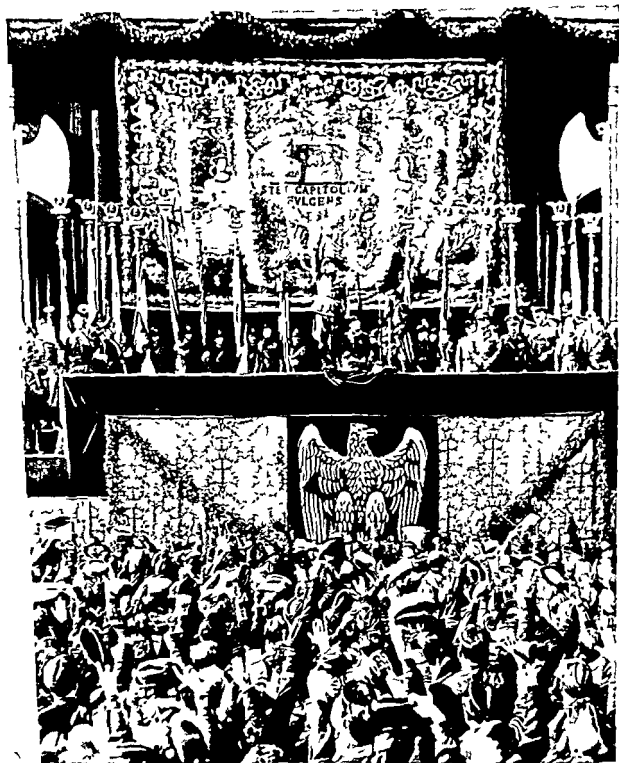
In this Ancient Trattoria of the Gladiators hung four discolored canvases. Nero's leering face was silhouetted on one against the burning city he had ruled so tyrannically. Horatius stood with broad sword in another, stubborn and alert his back to the now tottering bridge he had held while Romans wrecked it. He looked disdainfully upon Tuscans who would have

crossed but who cringed at seeing their bravest lying dead at his feet.

In the third painting Caio Muzio Scevola scornful of captors' cruelties had thrust his fist in among branding irons heating in a forge. Torture had been threatened unless he betrayed Rome. In the last a deft gladiator caught a springing lion on his upthrust sword.

The cry 'Hail Caesar!' We who are about to die salute thee echoed from throats of the condemned down the centuries across the street and through an open window beside me. In fancy I heard the growls of hungry beasts for I sat within the shadow of the grim old Coliseum majestic still.

Restaurant checks are often decorated—a cut of game or a bowl of fruit is common. But here in keeping with the spirit of the Ancient Restaurant of the Gladiators I expected to see a savage animal's face



Photograph from Wide World

SURROUNDED BY EMBLEMS OF ITALY'S GREATNESS, MUSSOLINI IS ACCLAIMED ON THE FOURTEENTH ANNIVERSARY OF THE MARCH ON ROME

In a setting of splendor at the Palazzo Venezia, Il Duce throws up his right arm in the Fascist salute on October 30, 1936, fourteen years after the coup which put him in power. Black Shirt officials fill the balcony except to the extreme right where stands a delegation of visiting Germans. Central figure on the background tapestry is the legendary she-wolf (Plate V and page 269).

lighted with after dinner satiety. The waiter brought my bill.

Grimacing from it, big as life was Mickey Mouse!

MIDGET CAR CALLED MICKEY MOUSE

In Italy he is Topolino. His mischievous portrait is often displayed: it runs the Duce's and the King's a close third for popularity. Many things are named for him officially and otherwise. Fiat's new sub-midget car smaller even than its little

Balilla was developed in an era of dollar and a quarter a gallon gasoline. People call it Mickey Mouse (Plate II).

While the rest of us in motion pictures produce only shadows of an imitation of life, said Tullio Carminati to me in Rome one day. Disney is an artist who *created* something. That's why he's been officially honored in Italy.

Though most pictures Italians see today are American, a modern cinema city is rising near Rome. Technically it will compete with the world's best. Carminati explained for Il Duce says so, and he's one politician who keeps his word. But productions should be suited to Italy, like the projected Scipio Africanus. Unless releases gain world-wide distribution they cannot return what great pictures cost.

A Government official told me he expected the new industry to be as effective as Government-controlled newspapers in educating the people and welding them even more securely to Fascism's ideals. And he added we don't like your cinema gangsters. You give them Italian names!

LIBRARY NEEDED TO KNOW ROME

Temporarily settled in Rome, I went to the station to retrieve my checked baggage and fell into conversation with an elderly American.

Do you know a comprehensive guide book, I asked him, with history?

Start with mythology, he replied. Study Rome's rise. Gibbon touches on its Decline and Fall in ten or twelve volumes. Pick up where he left off. Fifty good books to begin—

I gasped. He smiled.

Of course, he added, some of my colleagues in the States teach Roman history after a summer here. I've known visitors to do Rome in two days. A friend saw it between trains with me, later lectured on it to his Rotary Club.

You needn't laugh, he added. In an hour for seven cents you can make what Roman history you know seem real. From the Circolare streetcars you can see where much of it happened. They circle the heart of the old Empire.

We walked to the car stop. Over there opposite the station stood the Baths of Diocletian. Condemned Christians built them long afterward. Michelangelo used their ruins as a quarry. That church Santa Maria degli Angeli resulted. It stands at the head of Via Nazionale, a street between the Quirinal and the Viminal, two of ancient Rome's seven hills.

But they are scarcely hills. I protested. The buildings seem higher than that.

They are lower than they once were, he admitted, and the valley between is not so deep. But they're hills just the same. You've lived among San Francisco's seven hills too long. I'll show you a steep one presently.

TOBACCO IS NEVER WASTED

We sat in the second of two connected cars. Smoking is permitted there. The man across the aisle took from his case a carefully extinguished half-smoked cigarette, finished it in a holder that gripped its very end. A youth darted about the car, gleaming a few short cigarette stubs. Tobacco has always been costly in Italy.

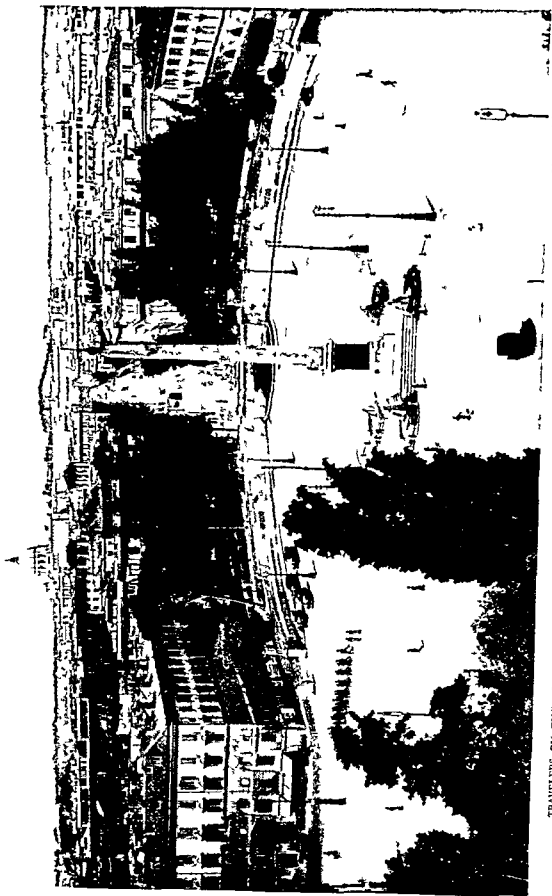
My companion folded our fare receipts into a narrow strip and slipped them beneath his finger ring as other passengers did. Inspectors come aboard, he explained.

Here's the Church of Santa Maria Maggiore, a legendary landmark. The Virgin told a patrician to build it where he first found snow on the slopes of the Esquiline Hill. On the summit stood gardens of Horace's patron Maecenas. * Nero's Golden House and those scandalous baths first Titus then Trajan's. Some ruins remain.

And there's the Colosseum! I exclaimed. One ruin you needn't point out. (Plate XIV.)

It was pointed out to me, chuckled the professor, by a little boy who jerked his thumb toward it, said Colosseo, and extended his hand for payment. That was guiding reduced to ultimate simplicity.

* See Horace, *Classical Poet of the Country*, side by W. Coleman Nevils in *THE NATIONAL GEOGRAPHIC MAGAZINE* for December 1935.



TRAVELERS ON THE GRAND TOUR USED TO ENTER ROME THROUGH THE SPACIOUS PLAZA, AS MOTORISTS STILL DO

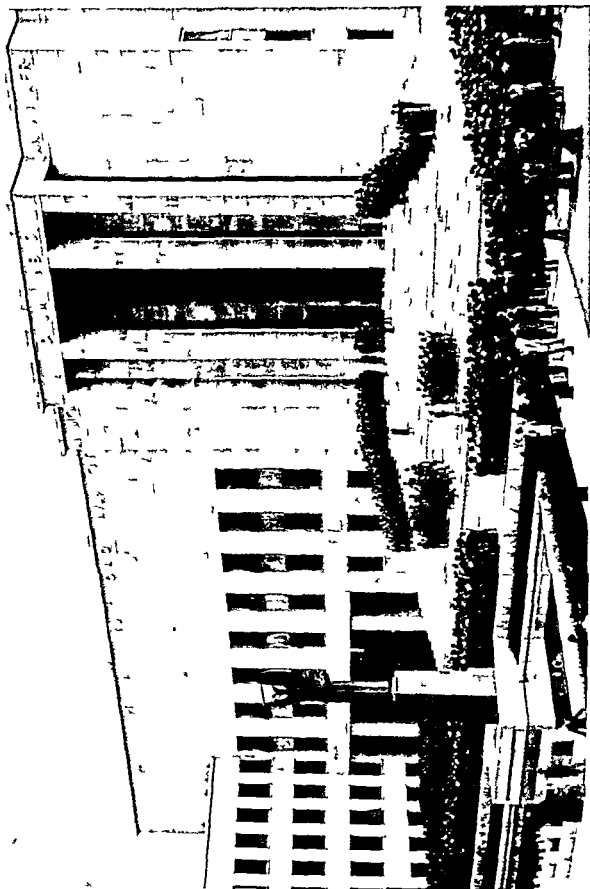
Photograph by Branson De Cou

Before the days of the railroad, visitors from countries to the north came by coach, horse or on foot along the ancient Via Flaminia across this Piazza del Popolo and on into the heart of the city. Brought to Rome from Egypt by Augustus some years before the birth of Christ, the 79 foot obelisk was first erected in the Circus Maximus. In 1589 it was moved to the Piazza. Westward beyond the Tiber to the hill occupied by Vatican City stretches one of the capital's broad avenues. On the sky line St. Peter's rears its dome.



ALONG A SHADOWED WALK AT ALBANO STROLLERS SAUNTER BETWEEN WALLS OF PINES OVERTOPPING THE CAMPAGNA
This region is celebrated for its 'Wine of the Castles'. Letters on the pavement indicate it was laid in the tenth year of Fascism, 1932

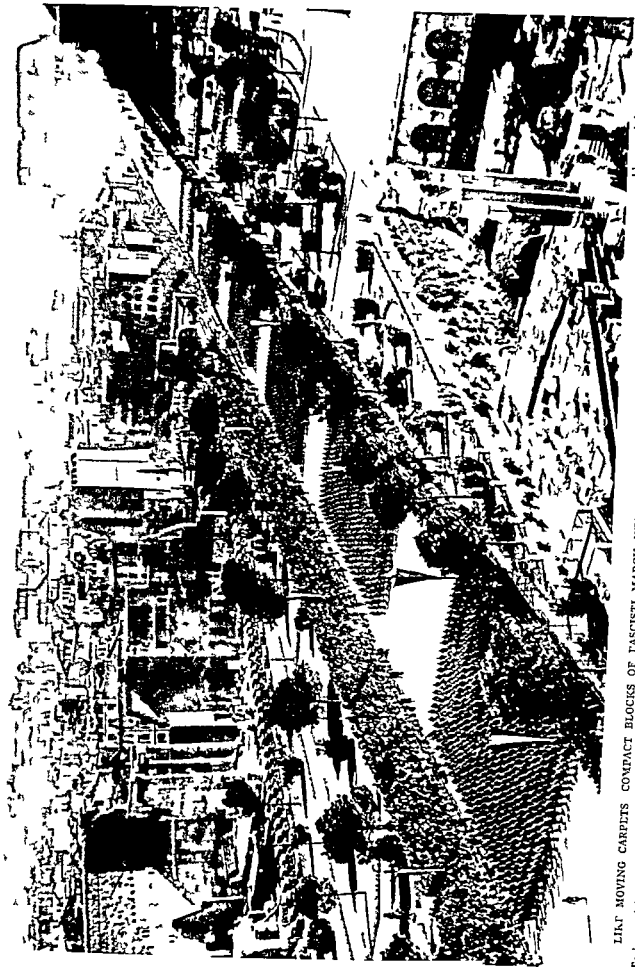
Photograph by Bernard F. Rogers Jr.



ITALIAN YOUTHS ARE AWARDED GOLD MEDALS FOR INTELLECTUAL VICTORIES

On the steps of the Rectorate of Rome, the new University City, where the letter 'M' is the initial of the school's name. This new camp is the first of its kind in the world. It was formerly called 'M' and is now the 'M'.

It is a city, Bernard R. says Jr.



LINER MOVING CARPETS COMPACT BLOCKS OF FASCIST MARCH WHILE CAESARS TRAPPED AND CONQUERED PRINCES WALL PD IN CHAINS
 To honor Admiral Horthy visiting Hungarian Regent this parade was held along the new Via dell'Impero in November 1936. The Colosseum towers in the far distance and on opposite sides of the boulevard are columns of the Temple of Venus Genetrix (right) and the Forum of Augustus across the way.



A MOSAIC BILLBOARD GLORIFIES PHYSICAL TRAINING

Photograph by Bernard F. Rogers

The huge marble framed mural decoration covers one end of a classroom building in the new Mussolini Forum Italian physical education headquarters. Two stadiums (Plate II) and many lecture and study halls are provided where the Nation's athletic instructors are trained.

Did it work? I asked

Sure Candor and brevity in a guide merit reward

But look! Were going around the Coliseum a third of a mile at the base See it once by moonlight! Friezes of the near by Arch of Titus tragic forerunners of our comic strips tell of his siege of Jerusalem one of history's most terrible The Sacred Way runs through it to the Forum where we see those columns Beyond the Forum is Capitoline Hill (page 304) From a steep sided rock named for treacherous Tarpeia traitors were hurled to death The Palazzo Venezia once Embassy of the Venetian Republic is near

WHEN ITALY WAS ONLY A GEOGRAPHIC EXPRESSION

Embassy to what? I asked unsure of my history

To the Papal See When Napoleon handed Venice over to Austria in 1797 the city changed flags In 1814 you remember Metternich said Italy is only a geographic expression

It was more than that—a political mess Parts of Italy were controlled by one for eign monarch then by another Some heavily armed city states held out

Now the Palazzo Venezia is Mussolini's office (Plate I) Future historians may call today's extreme iron handed nationalism the zenith of a long slow pendulum swinging back to early Rome

Look to your left See those young Fascists in the athletic field Beyond them lie ruins of Caracalla's Baths Vast in size and equipped with every luxury then known they marked beginnings of Rome's fall Here men accustomed to hard campaigning grew soft on enervating pleasures

Impressive was that modern running track beside the grand ruin that spoke so eloquently of opulence and physical decay

We passed the Circus Maximus long and narrow lying between the Aventine (with its feet in the Tiber) and the Palatine Little remains except its cleared site Exciting must have been to see charioteers round turns at the ends The Circus seated 250,000

The Palatine continued the professor is a Latin hill in legend Rome's oldest By the river still stands the so-called Temple of Vesta a name which is probably erroneous (page 301)

Perhaps here the cradle of Romulus and

Remus—their mother had been a vestal virgin Rhea Silvia—was cast ashore In the church beyond is a marble mask the Mouth of Truth where oath swears thrust their hands It closed they saw on their wrists

Horatius bridge spanned the river near Isola Tiberina across it were Lars Porsenna's invaders

The island except for its bridges looks like an anchored ship even to the upriver prow I mused aloud like Alcatraz in San Francisco Bay

CONCRETE FLOATS IN THE TIBER

The Circolare streetcar rumbled along Lungo Tevere atop the Tiber's flood restraining masonry embankment A few gravel boats churned slowly up the yellow stream Along the shores shells of Fascist encouraged rowing clubs were stored in floating boathouses Wood is scarce so even hulls of boat sheds like many fences and telegraph poles are reinforced concrete

We saw perhaps a dozen bridges dating from Caesar's time to Mussolini's One was suspended from cables others were steel masonry or concrete

St Peter's is six blocks west So much of the marble beneath that dome you see came from the ruins we've passed My companion shrugged In 500 years another sentimental old historian will sorrow for buildings wrecked today to isolate what's left of ancient Rome

This isolation program is remarkable Old ruins are more imposing if surrounded by parks and squares instead of slums Il Duce may by inference point and say That's what you once were I'll make you great again

There's a contrast the modern Palace of Justice and Castle Sant Angelo built by Hadrian as a tomb (page 298) Benvenuto Cellini was imprisoned there You may still read an execution list

Italians are kind hearted for all their swagger Perhaps it's natural reaction from excesses of the past

CHILDREN AND ANIMALS TREATED KINDLY

In three months I did not see one animal badly fed or ill used I did not see a child punished corporally Laws are stern and strictly enforced Yet I cannot believe even after visiting Roman prisons that political prisoners suffer physical cruelty in Italy today



Photograph by A. me

CHINS HIGH SHOULDERS SQUARED BOY BLACK SHIRTS EMULATE IL DUCE'S POSTURE

Eyes left is the command as jaunty Balillas quickstep with toy rifles and blanket rolls during a review at Rome. The r corps is named for an 18th century boy hero of Genoa who threw a stone at an Austrian soldier thus starting the revolt that freed the city from foreign rule.

wall traveled on narrow Via Campania then returned to the newer wider Corso.

This wall is inhabited, averred my guide. Even a few artists have studios in the hollow interior. See the entrances and high windows.

I saw much of old Rome in that wall, bits of sculptured white marble and thin ancient bricks. I am glad it is not yet a quarry.

That heroic statue commemorates Rome's fall in 1870 to Victor Emmanuel's *bersaglieri*, the soldiers with bunches of wavy hat feathers. That wide street you see through Porta Pia is named for the day they entered it, the 20th of September. Then Italy was reunited.

Now we pass Castro Pretorio, a military post. Plumed golden helmets are copied from armor of ancient legions.

Here is the station. Amazing as that trip of less than an hour seems, you've glimpsed only a few fragments. How much more there is.

I hope was my companion's parting professorial advice. You do some close-up studying.

My next lessons self-assigned were

Rome today. I went afoot to classes. I roomed in a little pension or boarding house on a dark street but did not eat there. Tired I rested sometimes chatting with a friend whose home was in a magnificent hotel.

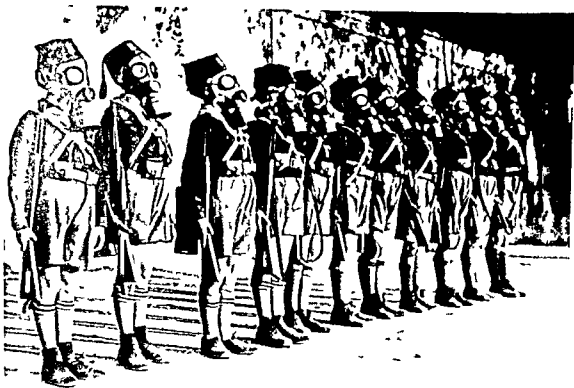
ALFONSO OF SPAIN IS GENIAL

We often saw former King Alfonso of Spain who lived there incognito safe under a strong government. He greeted genially all who spoke, talked little except to intimates.

I heard him mention himself once, remarked a clerk to me. He saw troubled Spanish headlines. My country was happier, he murmured, when I was King.

Rome is haven for many an alien. I talked with Jews running busy auto wrecking shops and wondered how many old cars America would scrap if metal jumped to war prices and four gallons of gas cost five dollars.

There are perhaps 25,000 of us in Rome, remarked the father of a large family, whose younger members watched him melt habbit from bronze bearings.



The togeth by Acme

WEIRD VISITORS FROM ANOTHER WORLD? NO, SCHOOLBOYS PREPARING FOR WAR

Drilling with gas masks and miniature rifles they stand as rigidly erect as Roman legionaries Italian youngsters don uniforms at six and receive real weapons in their 18th year on the traditional anniversary of Rome's birth April 21

"That's the Ministry of Marine upriver," the professor remarked as we recrossed 'It's a busy place. We're coming to the Borghese Gardens at the foot of Pincio Hill. I looked through a stone gateway at a broad tree-darkened avenue.

"That," observed my fellow countryman proudly, "is Via Giorgio Washington."

Near by is a street named for David Lubin, of California. More than 30 years ago he suggested the International Institute of Agriculture to Victor Emmanuel III, who built its palace in the Borghese Gardens. The United States, with some 70 other countries, is a member of this pioneer 'League of Nations' founded in 1905.

Where the Tiber did not protect the medieval city a well preserved wall still circles it and through the arched Porta del Popolo we glimpsed an obelisk, brought from Egypt before Christ was born (page 274). We wound along steep masonry banks of the Pincio, a garden now as always. From the top I was to see many Roman sunsets. An uphill road paralleled the tracks. Carts upon it paused in shady spots that horses or men who pulled them might rest.

"Look through the gate, Porta Pinciana, as we pass," said my friend, "at Via Vittorio Veneto" (page 299).

I knew the street. It curves uphill from the Piazza Barberini, named for the nepotic, luxury-loving pope whose old palace fronts it. Along this wide, tree-bordered way are fine hotels, Government buildings, and fashionable restaurants whose patrons sit outside on pleasant days (page 305). There are chromium and marble shops. Stock, fixtures, and patrons reminded me of Hollywood. When I first saw it, the street was gay with perky primroses in large oblong beds in grassy parkways. A few days later as if by Aladdin's genie, these flowers had vanished. Instead stately, deep-hued cyclamens cast starry eyes modestly at fresh-turned earth around them.

HERE IS NEVER A "LAST ROSE"

Thousands of plants are dug up and replaced every few weeks, the street is ever blooming. Via Vittorio Veneto is often the first promenade of foreigners in Rome.

We continued along Corso d'Italia. The car popped suddenly through a gap in the



CHINS HIGH, SHOULDERS SQUARED, BOY BLACK SHIRTS FMULATE IL DUCES POSTURI

Eyes left! is the command as jaunty Bahillas quickstep with toy rifles and blanket rolls during a review at Rome. Their corps is named for an 18th century boy hero of Genoa who threw a stone at an Austrian soldier thus starting the revolt that freed the city from foreign rule

wall, traveled on narrow Via Campania, then returned to the newer, wider Corso

"This wall is inhabited," averred my guide. Even a few artists have studios in the hollow interior. See the entrances, and high windows

I saw much of old Rome in that wall, bits of sculptured white marble and thin, ancient bricks. I am glad it is not yet a quarry

That heroic statue commemorates Rome's fall in 1870, to Victor Emmanuel's *bersaglieri*, the soldiers with bunches of wavy hat feathers. That wide street you see through Porta Pia is named for the day they entered it, the 20th of September. Then Italy was reunited

Now we pass Castro Pretorio, a military post. Plumed golden helmets are copied from armor of ancient legions

Here is the station. Amazing as that trip of less than an hour seems, you've glimpsed only a few fragments. How much more there is!

I hope, was my companion's parting professorial advice, "you do some close-up studying"

My next lessons, self assigned, were

Rome today. I went afoot to classes. I roomed in a little pension, or boarding house, on a dark street, but did not eat there. Tired, I rested sometimes chatting with a friend whose home was in a magnificent hotel

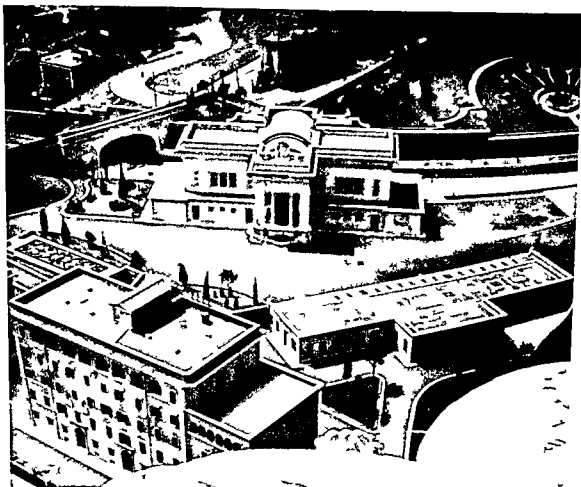
ALFONSO OF SPAIN IS GENIAL

We often saw former King Alfonso of Spain, who lived there incognito, safe under a strong government. He greeted genially all who spoke, talked little except to intimates

"I heard him mention himself once," remarked a clerk to me. "He saw troubled Spanish headlines. 'My country was happy,' he murmured, 'when I was King'."

Rome is haven for many an alien. I talked with Jews running bus, auto wrecking shops and wondered how many old cars America would scrap if metal jumped to war prices and four gallons of gas cost five dollars

"There are perhaps 25,000 of us in Rome," remarked the father of a large family whose younger members watched him melt babbitt from bronze bearings



Photography by F. Z. Henkel from Florence

WHAT THE HALF MILE VATICAN RAILWAY LACKS IN LENGTH AND PASSENGER
VOLUME IT MAKES UP IN EXCLUSIVENESS

From Vatican City's own station (center background) the papal train runs south a scant half mile to join the main Rome-Viterbo line. In the left foreground is the Palace of Justice; new mosaic workshops are located in the low flat-roofed building. Occupying only 108.7 acres the city has a population of about 1,000 and is a sovereign State—the exclusive property of the Holy See.

Many of us fought in Ethiopia. We are free to worship as Judea—but we are Romans too.

Another Jew, a retired clothing merchant, said he lived in Rome because "here I feel more equality than I ever knew."

The city is hospitable but not in our sense. One Italian long in the diplomatic service in America spoke eagerly of his country. Friends invited me to their houses. If I had a visitor they'd say, "Bring him along. It's O.K. That couldn't happen here where homes are for the family—our ties are close, you know—and for life-long friends. But our reserve tends to melt."

Suiting action to words, he took me to

dine with his father, one of Rome's distinguished attorneys at the latter's apartment.

The compact, high-ceilinged rooms were in fine taste, dark with heavy furniture and art objects as yet unsupplanted by creations of modernistic designers whose hand is everywhere in Rome. Romans prefer apartments often own them outright. Moving day comes seldom.

LAW REQUIRES BATHROOMS

I heard much in America of Italian lack of these conveniences, remarked the diplomat, showing me a well-equipped bath—and among the poor it has been bad. Today permits to build houses, however expensive, are denied unless plans include

bathrooms for each family

We dined on omnipresent well oiled salad served with large cowhorn fork and spoon. There were meat and soup and spaghetti. The latter two dishes were sprinkled with grated long aged Parmesan cheese—used in Italy more often than tomato catsup in America.

Over tiny cups of black coffee in the library I talked law with the diplomat's father still actively practicing. Legal delays he admitted were as common in Italy as in America.

I asked about jury trials.

We believe in them. But we don't think judgment by twelve of a man's peers selected by lot is fair either to the accused or to the State. A jury of masons, housewives and shopkeepers can not know the law, cannot examine evidence dispassionately. Our jurymen are especially selected for each case by the court for their knowledge of its subject, their scientific fairness and legal training.

ALI BABA PUZZLE SOLVED

I paused in the doorway of an olive oil shop to light a fine Italian briar pipe, economically half filled with treasured American tobacco mixed with Italian to make it last.



Photograph by John La

PALAZZO ZUCCARI MAKES A FACE AT PASSERS BY

The grotesque giant's mouth is a side entrance to the 16th century building now occupied by the Biblioteca Hertziana, one of the leading libraries of modern art in Italy. A workman resting on the steps wears a news paper hat, popular headgear in many parts of the world.

Oil was stored in brick colored jars where Primo Carnera could have hidden. That solved a childhood puzzle, how the Forty Thieves could get into the jars in which they were killed with boiling oil.

I walked beside the Tiber, enjoying intimacy with the ancient river, but forced to go cautiously lest I tread upon ill smelling refuse. An old man fished patiently from the bank. Useless were hook and line in that muddy water, he used instead a large dip net, like a child's toy parachute made of a handkerchief with strings tied to the corners. It rested on or near the bottom occasionally he withdrew it fruitlessly with a rope and pulley. In the hour I talked to him, he caught two fingerlings.

SIMPLEST WORDS MOST DIFFICULT

In a few weeks I had learned to talk with patient Italians who knew no English. I knew *z* generally has a "ts" sound, learned when 'g' was soft, remembered Italian pronunciation of 'c' in 'Santa Lucia,' and practiced vowel sounds.

My first efforts, using simple Anglo Saxon words of pidgin English, had been vain. I was far from Italian in using 'like,' which is 'piacere,' but on common ground with 'ammirazione' or any 'ion' words.

A startling pronunciation lesson had come from an Italian asking of 'Mrs. Alice Wallace.' He called her 'Ah lee-chay Val lat chay.'

The fisherman pointed to an unattended, homemade boat tied to a bridge pier in swift water. On poles at right angles to a long shaft were two dip nets and between them were intermediate paddles.

Around with the current went the contraption, occasionally lifting high a netted fish and dropping it neatly into a funnel shaped container.

'Some day,' he said, 'I make a boat like that to fish for me.'

How long have you been fishing?"

'Many many years,' he replied.

I bought his afternoon's miscellaneous catch for about sixteen cents. For dinner I had them incorporated into *suppa di pesce*.

I liked soup of fish boiled in tomato broth and poured over sliced bread on a flat plate.

A certain Neapolitan restaurant in Rome is decorated with painted night scenes softly illumined from behind in translucent *stucco*. Vesuvius spits fire, stars and moon

shine on a twinkling city, lights gleam from boats in the Bay of Naples. Even a square old lantern carried by a fisherman looks real. There I once ordered soup of fish.

Straddled on the steaming heap was a delicate baby octopus, tentacles curling tenderly over shrimp, mussels, fresh sardines and a mullet.

ITALY HELPS PAY ROME'S BILLS

Rome, ruling the Italian Empire does not rule herself. Municipal self government ended in 1925. In the mayor, an appointee, is vested power formerly exercised by mayor, aldermen, and council.

Citizens of all Italy help bear the burden of civic beautification. Rome could not pay her enormous bill alone. Dreams of artist engineers are too far reaching.

Streets even in old quarters are clean. Where dark stone tenements are demolished for parks and squares, former inhabitants move to gigantic apartment houses on the edge of the Roman countryside. I visited one, the home of 500 poor families, imposing, yet simply built within and furnished usually with humble, long used tables, chairs, and beds. Two rooms rent for about \$9.50 monthly, four for \$20.

Italian upper and middle classes, who staff growing Government bureaus, dwell usually in ultramodern apartments, five or six stories with elevator, outside the old city walls. I saw little construction, except Government buildings, in 'downtown' Rome, although many expensive shops are modernized to attract what United States advertisements call "exclusive patronage."

Even Rome's oldest parts swarming with well fed stray cats, are virtually fireproof. I saw no fire apparatus. Hydrants seldom needed are hidden beneath iron covers at sidewalk level.

The Apostle Peter was crucified they say, on Vatican Hill where stood the Gardens of Nero, one of the cruellest oppressors of Christians. Nero is but a dim hateful memory. Peter and his words still live, and Christendom's largest church stands above his tomb.

Ending long strife between Church and State, Mussolini signed the Lateran Treaty in 1929 making the State of Vatican City sovereign. By this accord it cannot engage in political controversy except when disputants unanimously ask it to mediate. Its power is moral and spiritual.

Otherwise the Pope is absolute legislative,



© National Geographic Society

Dufaycolor Photograph by Bernard F. Rogers Jr.

**ROMANS SWARM PIAZZA VENEZIA AS A MODERN CAESAR
LEGIONS OF UNIVERSITY STUDENTS**

Bright neckerchiefs mark the Fascist University Groups who parade slowly past Premier Mussolini's reddish reviewing stand in front of his headquarters the Palazzo Venezia (left) built in the 15th century with stones from the Coliseum. This review on October 28 1936 commemorates the 14th anniversary of the Fascist March on Rome when Il Duce came into power. Italy's flag waves on the colossal National Monument to Victor Emmanuel II symbol of the Nation's unity.



© National Geographic Society

MICKEY MOUSE

at 500 is the only two-wheeler's trade name

from Italy's Provinces

again ready to compete in the stadium

Play Photograph by Bernard F. Rogers Jr

AT THE MUSSOLINI STADIUM

Huge marble athletes gifts

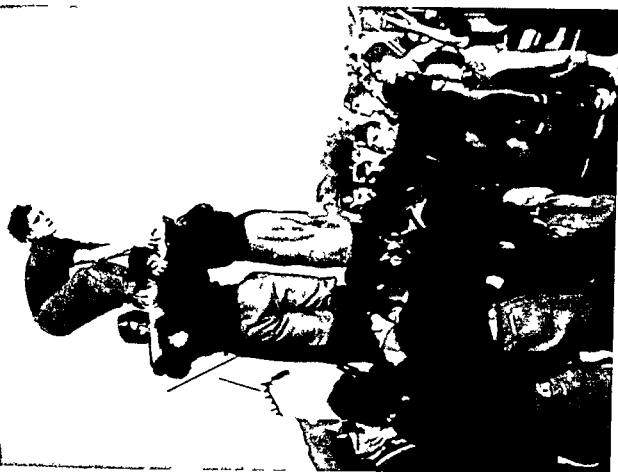
one prefers a breezy ride



© National Geographic Society

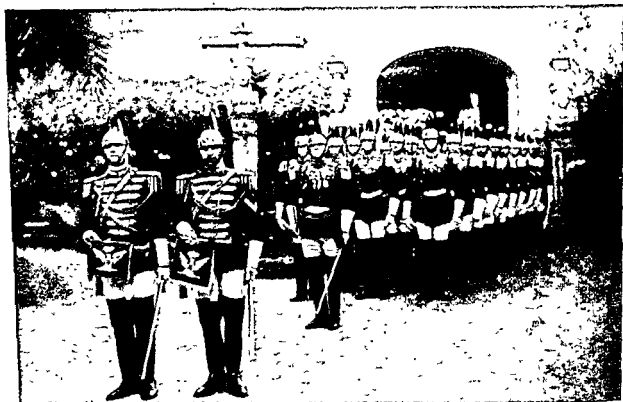
ROMAN GIRLS DON PROVINCIAL COSTUMES FOR THE ANNUAL GRAPE FESTIVAL

Vine products from many districts are displayed in the Basilica of Constantine for vineyards flourish near the Eternal City as in the days when Horace depicted a Roman nose in wood Falernian wine



Italy Photographs by Henry J. Rogers Jr
ACTION! BEGGED THE PHOTOGRAPHER AND THE BOYS
CHILDREN OBLIGED

These Young Fascists were resting between drill periods at a camp near Rome to which they came from all over Italy for a review by Mussolini on their organization's sixth anniversary in October 1936 (Plate IV)



IN UNIFORM-LOVING ITALY, NO TROOPS OUTSHINE THE ROYAL BODYGUARDS

Of equal height and strapping build, these cuirassiers are picked from the carabinieri (police) and the Army. After preening before a full-length mirror in the gateway, this detachment is ready to report to the palace on the day of U. S. Ambassador William Phillips's presentation to King Victor Emmanuel III.



©National Geographic Society

Finlay Photographs by Bernard F. Rogers, Jr.

"SPEED" IS NEW ITALY'S MOTTO, SO MODERN ROMAN LEGIONARIES TRAIN ON MOTORCYCLES

White pup tents house the husky Young Fascists (Plate III), who join this organization at 18 and become full-fledged Black Shirts at 21. Their neckerchiefs bear Rome's colors, red and yellow.



PLUMPY BACCHUS' ROLLS HIS TONGUE AS IF LAPPING UP A STREAM OF WINE

When the oxen get under way the barrel like tongue revolves. Bacchus (Dionysus) was the ancient Roman and Greek wine god. Girls in the costume of near by Frascati toss bunches of grapes to spectators during the parade a part of the Grape Festival. About 25 floats were entered.



© National Geographic Society

Finlay photographs by Bernard F. Rogers Jr.

MASCOT OF THE FRASCATI FLOAT IS THE SHEP WOLF FOSTER MOTHER OF ROMULUS AND REMUS

Tradition says she suckled Rome's legendary founder and his twin brother. Treasured in the Palazzo dei Conservatori is the original Etruscan bronze figure of the animal 2,400 years old.

© 1964 The Geographic Society

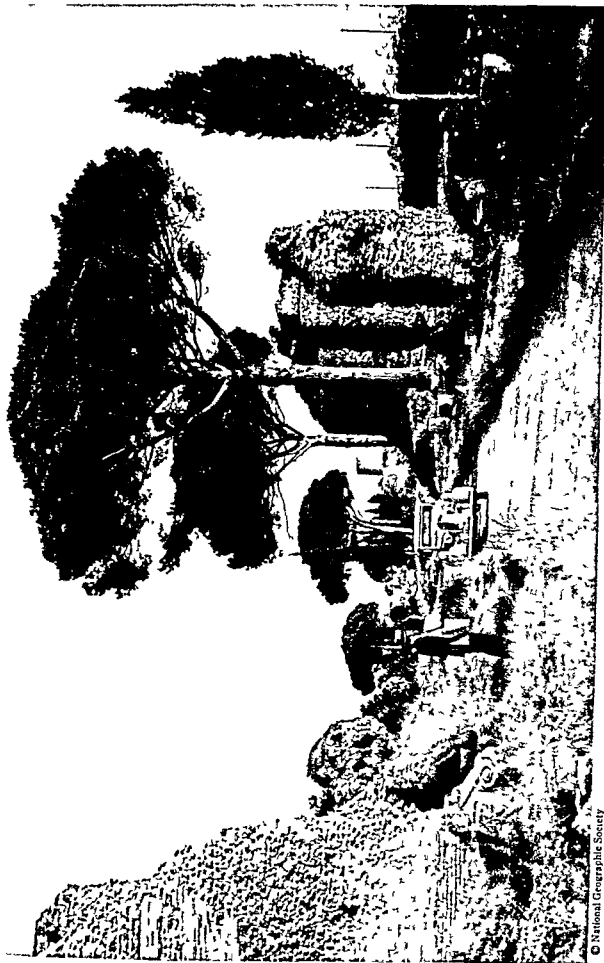
UNIVERSITY STUDENTS SIP COFFEE BETWEEN CLASSES

The rich blouse bar serves the popular *café espresso* made by forcing steam through a chamber containing freshly ground Brazilian beans. The vapor condenses to make about half a cup of potent, tasty coffee. Each student's necktiechief bears colors denoting his course.



Playboy photographs by Bernard I. Rogers Jr.
SHAVE ME AND I'LL SHAVE YOU

A smiling young Fascist operates on a commode in a camp while another's face waits its turn (Plate III). On the truck door is painted the Fascism's badge—derived from ancient Rome's fasces, or symbol of authority—a bundle of rods with a protruding axe blade.



© National Geographic Society

CHARIOTS ROLLED AND HELMETED LEGIONS CLANKED ALONG THE APPIAN WAY WHEN THESE RUINS WERE STATELY TOMBS AND TEMPLES

Play Photograph by Bernard F. Rogers Jr

Saint Paul, Emperor Augustus, the poet Virgil and other figures of antiquity traversed the Via Appia when this was chief among all the roads that led to Rome. Built more than 2,200 years ago, the paved military highway led southeastward to Capua and across the peninsula to Brindisi, on Italy's 'heel', thus linking Rome with the Adriatic, Greece and the Empire's eastern provinces



© National Geographic Society

Play Photograph by Bernard F. Rogers, Jr.

AS BIG AS PING PONG BALLS ARE SOME OF HER PLUMP TABLE GRAPES

Two bunches on a stick make a heavy handful for this petite salesgirl at the Grape Exhibition (Plate III). The telltale wrist watch shows that she is no country lass despite her old-fashioned festival costume with embroidery and gold buttons. Many of the pretty vendors at the exhibition are movie extras from a big local studio.

judicial and executive head of his 108 7 acre art treasure picked State Italy guarantees right-of-way by wire, highway, rail and air to the world Exempt from Italian taxes Vatican City may issue stamps and coin money (Plate IX and page 282)

The Tsar of all the Russias once visited the Pope He paused beyond rainbow shot spray to watch two enormous fountains scintillating in the sunny colonnade-encircled piazza at St Peter's

'They're gorgeously beautiful!' he exclaimed Now you may turn them off

He was astonished they say, to learn that Roman fountains not operated solely for him played constantly

ROMAN FOUNTAINS FLYER FLOWING

Men may come and men may go, but I go on forever Every old fountain seems to murmur these lines, and well they may for many have played virtually without interruption since the repair of barbarian destroyed aqueducts from the same mountain rivers supplying Rome today

The late Professor A D Tani who loved his city and knew it as few contemporaries did apologized that his Fountains of Rome contained only 300 illustrations

Water flows from mouths of animals and fishes drops down artificial waterfalls pours in unbroken sheets like shimmering glass shoots skyward geyserlike and returns as misty rain into great marble basins green with moss It trickles down rock ledges it gushes sometimes in torrents like a mountain trout stream always pure enough for drinking (page 295)

Imaginative Roman artistry has found wide scope in such creations as Bernini's Fountain of Trevi or the stone ship at the Piazza di Spagna

There are numberless utilitarian fountains of iron where men and horses drink where housewives wait for jugs to fill Water is not piped to every Roman home Cold even in summer a stream of it is used for refrigeration by restaurants and coffee shops Fruit milk soda pop are so cooled

This use of stone and mortar instead of wood and of pastel shades of calcimine sprayed with air brushes instead of bright paint gives the city a look of solid security Names of streets are graven in marble slabs fastened to corner buildings and garden walls

Though Italians like Chinese hide ornate gardens behind dull masonry I recall sur-

prise at Rome's outward physical beauty My first impression was that Fascism's public works were transforming the country's aspect completely Only after I began to wander about the peninsula, particularly in the south did I realize that Italy is not mirrored by Rome Unlike other Italian cities she is capital of a growing Empire—and looks it

GOLD BRICKS AND COUNTERFEIT MEDALS

Curious to know what happens when the fine Italian hand turns to crime I persuaded Torquato C Grinnini to show me a crime museum firmly closed to the public He was admitted because he had been Chief Justice of the Supreme Court of Italy's best friend among sovereign world States the 38 square mile Republic of San Marino in the heart of Italy but independent

Exhibited was a complete set of plates for counterfeiting American passports There was a breastful of shiny medals struck in his basement by a harmless megalomaniac who delighted to wear them all and awe the neighbors

Ingenuous lethal weapons were numberless There was a mask of iron to curb a gossiping wife a chastity belt an over-ambitious taximeter and even a few gold bricks!

Most mystifying in a crime exhibit were two musty old paintings Most interesting were crude mints but *that* collection was incomplete Profusion of counterfeit five- and ten lire pieces forces Roman shopkeepers to test each one I saw much bad money rejected

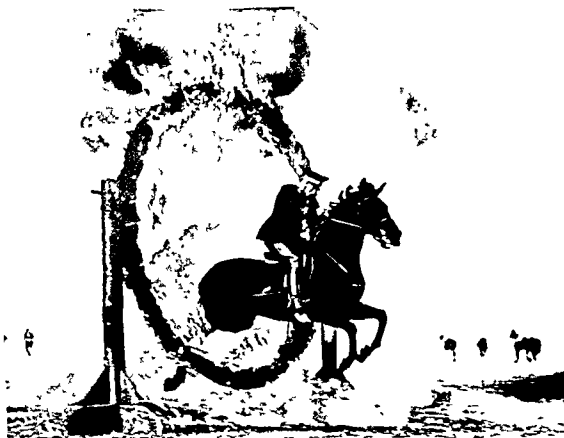
Modern decorative art had transformed the old prison that now houses the museum A painted monk looked benevolently upon a suppliant wolf

Peasants appealed to Saint Francis of Assisi when the Wolf of Gubbio stole sheep explained the custodian Is it because you are hungry? asked the holy man of the thieving animal Receiving an affirmative reply he promised food always and here exacts a reformation pledge

That's appropriate I commented Who painted it?

An artist ignored by critics studied old masters Soon he was painting similar subjects aging them and having his masterpieces found They brought high prices

The artist grew bolder When he sold these two old paintings you saw a moment ago he was found out and imprisoned All



Photograph from Wide World

JUMPING THROUGH FIRE FOR THE GLORY OF "THE FORCE"

A mounted policeman pierces the flaming ring during a review held before Mussolini to celebrate an anniversary of the department

Italian prisoners work, his job was decorating this museum. He painted Saint Francis and the Wolf.

"He is a success now. Customers think a man who could paint a new subject with the touch of a dead genius must have ability."

THE AUTHOR SAMPLES PRISON MENU

In Rome my companion was often Nika Tucci. His family were of the nobility, his education included several recent years at Amherst and California.

Tucci was sympathetic with Italy's new order, 'because the old was so bad,' yet looked upon his Government with penetration, more enthusiastic over the panorama as a whole than over certain parts of it.

He translated foreign papers, redelivered Il Duce's speeches in German for the Government broadcasts to Germany.

One day we went to a city prison across the Tiber.

We paused at the archives, where Roman

crimes of past centuries were set down briefly. I took one old book from the dusty shelves.

"What did he do?" I asked, pointing to an entry.

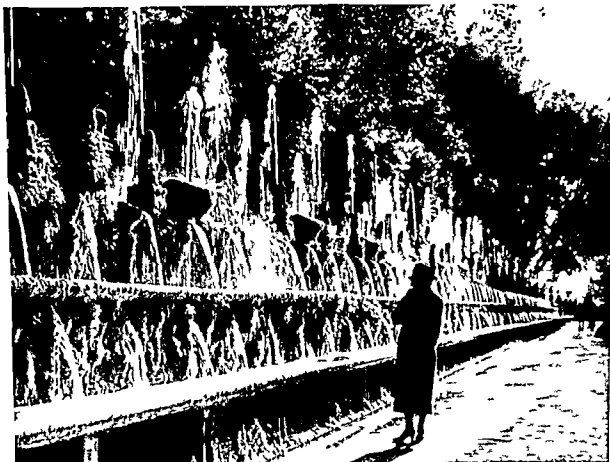
"Murder. Sentenced to ten years, but pardoned in three by a duke's intercession."

"And this one?" I continued. "He was 17? And isn't this word 'candles'?"

"Yes. Stolen 'from a church.' He got three years and served them. The next man stole something, it says, 'not church property, but from a sacred place.' Two years. Those days are gone. It's fairer now," said Tucci.

A guard brought soup and fresh bread to the director. He tasted carefully. "This is required of me to prevent bad food," he explained. "Last week I rejected 300 pounds of meat."

"Let me try it," I asked, and sampled beans, chopped green vegetables, and macaroni bits in thin broth. I ate enough to think its food value superior to its flavor.



Photograph by Bernard F. Rogers Jr.

JETS AND SPRAY FORM A TALL HEDGE ALONG THE AVENUE OF 100 FOUNTAINS

Generations of Romans have come holiday making to the peaceful green gardens of the 16th-century Villa d'Este at Tivoli near the capital. Water is pumped from a stream to the terraced hill where it flows in rivulets and splashing fountains throughout the cypress shaded grounds. Cardinal Ippolito d'Este, former owner of the estate, is said to have lodged in the palace here his suite of two hundred and fifty gentlemen of the noblest blood of Italy.

"You don't like it?" hazarded the director.

"No," I replied. "But I liked the bread."

Then he explained that prisoners, whom I had seen in the printing shop and other departments, were paid in money, and allowed to buy salads, pastry, vegetables, even lamb cutlets.

We went, at my suggestion, to cell blocks where men who worked together in silence ate in "solitary." Guards carried trays of choicer food, occasionally passed one dish or another through cell doors to supplement soup and bread.

GOOD PRISON MEAL IS COSTLY

I asked to taste them, and was taken to a well-manned, efficient looking kitchen, where soon appeared a complete lunch, even a small pack of cigarettes.

"You see," said the director, "they can have anything!"

"Molto buono!" I said expansively to the kitchen staff, but their faces, indicating pleasure in even so small a break in routine, formed no words. "Talking is forbidden," I was told.

A conscientious "taster," I ate heartily of fish, omelet, meat, salad, artichokes boiled in oil and spaghetti with tomato sauce and cheese.

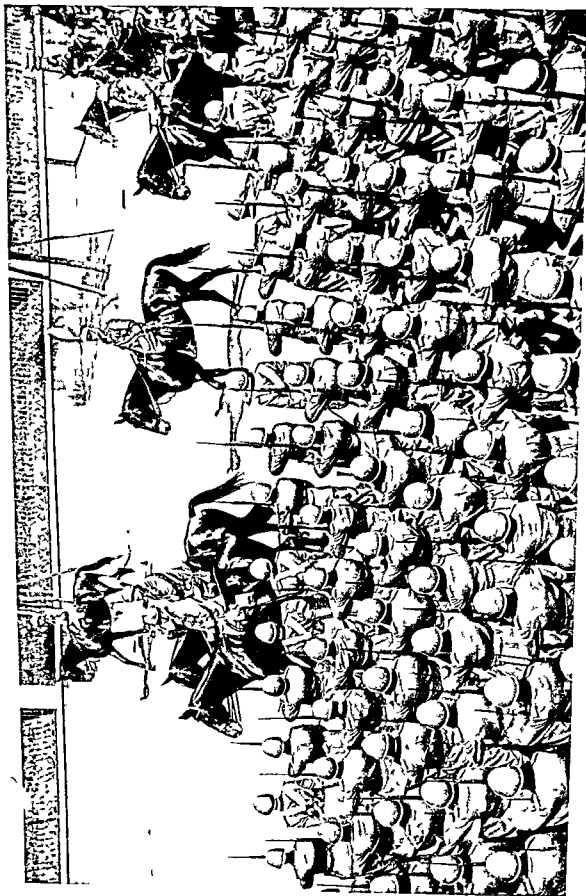
Tucci helped me to see the price list—about the same as that of a trattoria.

"How much are the men paid?" I asked. "Most skilled artisans, ten dollars a week, maybe more."

But the average man," I persisted. "Like me. If I were here, I'd feed a printing press, probably. How much would I get?"

"Two lire a day."

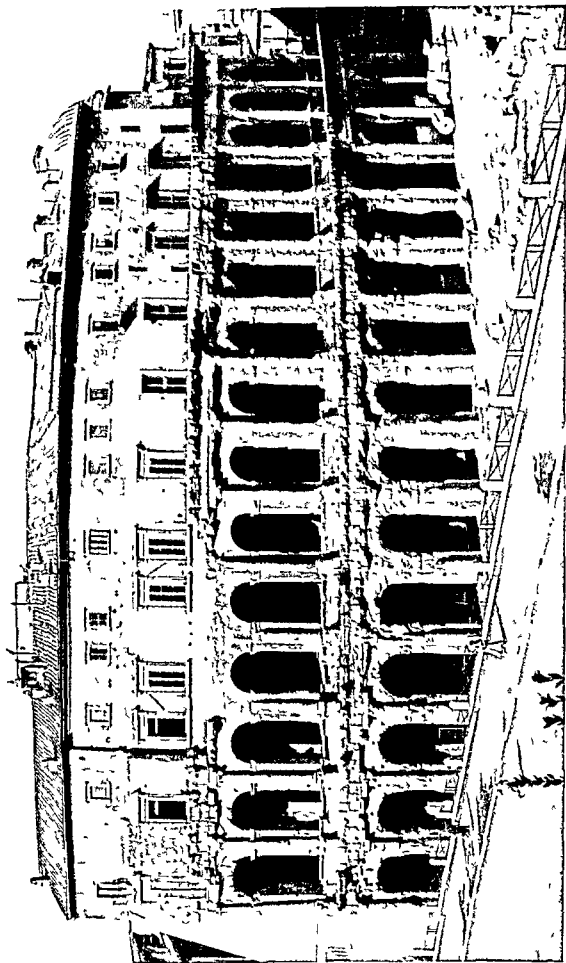
The lunch I had so blithely and substantially sampled would have cost, with cigarettes, more than a week's salary!



WHEN THEIR KING PASSES, ROMAN LEGIONS OF TODAY PRESENT ARMS

© Interquay & from Pictures, Inc

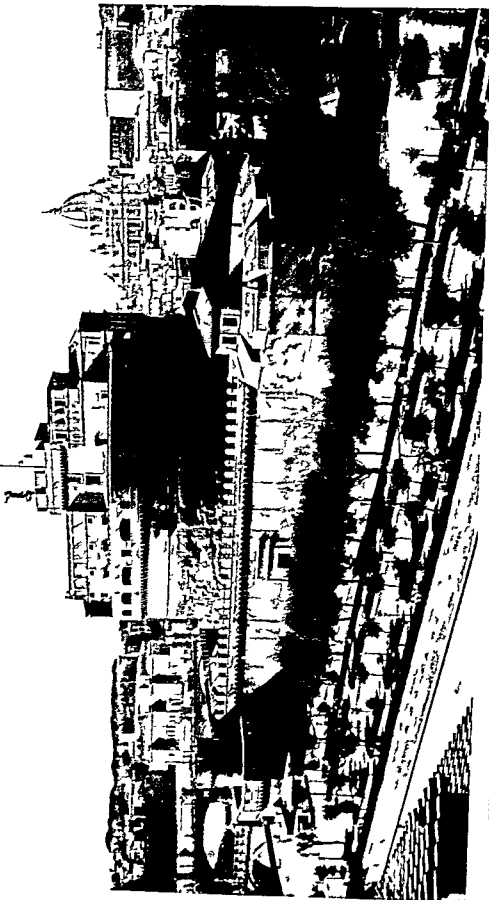
At the right center wearing a plumed cap rides Marshal Badoglio hero of the Ethiopian War On October 10 1936 the Premier announced a rearmament program in which a principal item was the construction of two huge military airports near the Adriatic



© Donald McLeish

CHEERS OF THE ROMAN MULTITUDE ONCE ECHOED THROUGH THESE SPLENDID ARCHES

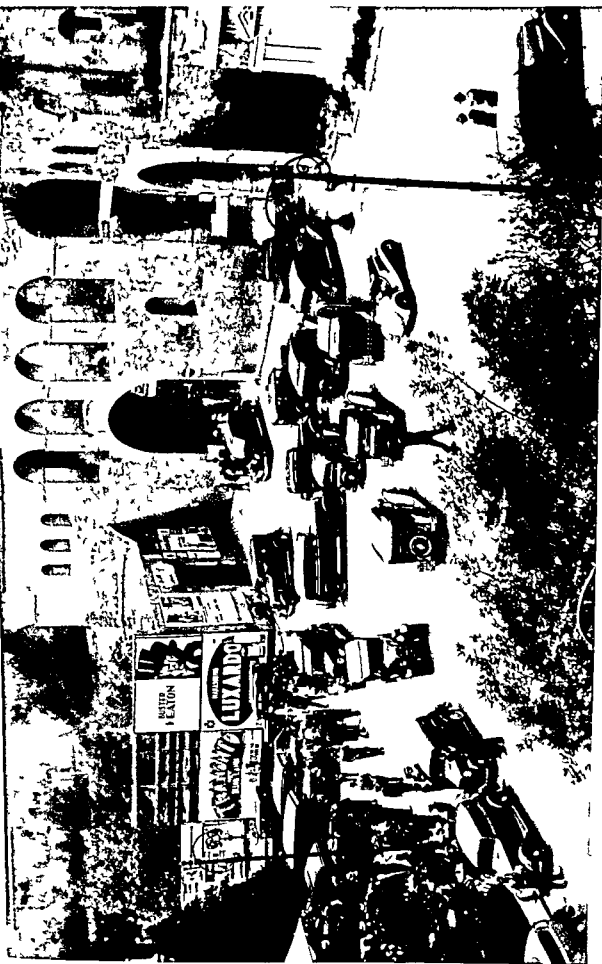
The Emperor Augustus dedicated the Theater of Marcellus in 13 B.C. to his youthful and promising nephew who had died ten years before. Thirteen thousand spectators once jammed its stone seats to enjoy pageantry, pantomime and plays. Of the elegant triple colonnade that backed the building, only this battered section remains. The third tier of arches was absorbed into the medieval Orsini Palace, which still crowns the ruins. Archaeological housecleaning of recent years has cleared away dwellings and shops that cluttered the lower arches.



Photograph by the late LT Rogers Jr

FOURTEEN CENTURIES AGO DEFENDERS OF CASTLE SAINT ANGELO HURLLED MARBLE STATUES ON ASSAILANTS HEADS
Built between 135 and 139 A.D. as a tomb for the Emperor Hadrian and his successors the Round Castel was repeatedly attacked and often taken and often taken (page 29). The find appears the front of St. Peter's Basilica. At the left by the side of the Tiber

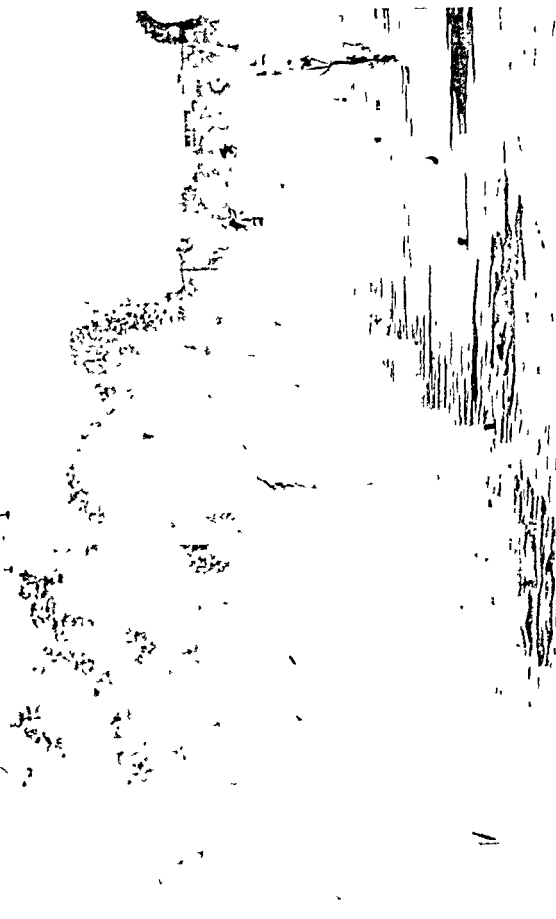
At the left by the side of the Tiber



Photograph by LUCE from ENI

CARS JAM A BOTTLENECK WHERE THREE ROADS MEET AT THE PINCIANA GATE IN AURELIAN S WALL

Posters advertising American movie stars fill two billboards at the left. Here ends Via Vittorio Veneto, a wide tree-bordered street with fine hotels, mansions, cafes and shops (page 280). Beyond the gate, fortified by Belisarius against the Goths in the sixth century, lie the gardens, museums and fountains of the Villa Borghese, now officially called Villa Umberto Primo. This gateway pierces the high brick wall that enclosed Imperial Rome.



WEARING SUN HELMETS, COLONIAL TROOPS RAISE THE BUTTS OF THEIR RIFLES IN SALUTE TO IL DUCE AT A MILITARY MUSTER
On Intervention Day, all Italy celebrates the anniversary of its entrance into the World War on the side of the Allies May 23, 1915



BEYOND THESE SHRINES OF ANCIENT ROME LIES A MODERN CITY OF MANY DOLLS AND SPIRES

Photograph by Bernard F. Rogers, Jr.

About 400 public churches are now found in the capital. Archaeologists are uncertain of the deity to whom the so-called Temple of Vesta was dedicated. Except for the graceful Corinthian edifice probably looks much as it did in Roman times. The small Temple of Fortuna Virilis (right) perhaps dedicated originally to the Goddess of Fortune. The larger dome seen above the trees caps the Synagogue. St. Peter's appears in the left background beyond a succession of new and old bridges over the Tiber.

Next day I saw another phase of Italy's penal system in establishment where prisoners' families deprived of support could obtain food. Here the convicts themselves might work when released; it hunger preventing wages until other jobs were found for them.

In 1933 Italy tried 209,959 people for crimes. That is a surprisingly large number in a country so heavily policed, so thoroughly locked and barred. Everyone's whereabouts is always known. Not all those tried were convicted. I talked with some who had been.

One was carpentering. I asked him what he'd done. I stole some railroad iron, he replied a bit shamefacedly.

When I was a kid I did that. I told him. He brightened and he could live and eat on what he earned here and explained that like the Wolf of Gubbio, he was bad only when hungry.

RIISING COASTS STRAND ROMAN SEAPORT

When some of the Pontine Marshes were sea, when navies were galleys and triremes, Ostia at the Tiber's mouth 14 miles south west was Rome's seaport. It was built on the site of an ancient settlement where the Tiber forks to form Sacred Island.

Pliny the Younger who survived the eruption of Vesuvius that destroyed Pompeii and wrote a graphic account of it often quoted today once lived near Ostia down the shore road in a seaside villa. Worn paving stones uncovered pointed my way to the ruin as I walked where Pliny rode. It is a shore road no longer.

Ostia's ruins are being dug from the sand three miles inland. (Page 305.)

Rising shores and river silt have often blocked the harbor. Mussolini has not yet followed Claudius Trajan and Pope Paul V in building a seaport adequate for Romans and their times.

Romans today play on the beach where Lido di Roma, a new town stretches two miles along the present shore. Crowds come by electric car or new auto speedway and only glimpse the Tiber. (page 320.)

Fiumicino where the north fork flows between stone banks is a seaport they seldom visit. Little shallow draft boats furl their sails and lie along the quay at a salty town lightly touched by time.

I invited a captain to eat fried eels in a trattoria that smelled, tasted and sounded of the sea.

'I'm freighting marble,' he said. 'We had a fine wind—left Marina di Carrara yesterday. I wish we could sail to Rome. Then we really could compete with the rail road!'

Why not? I asked. 'Didn't ancient galleys go to Rome?'

Perhaps, but I can't, he replied and pointed through the window at machinery growling and rattling on a scow. That little dredge runs most of the time to keep even this narrow harbor channel deep enough.

FLYING BOATS TAKE OFF FROM TIBER

The south fork of the Tiber though it enters the Tyrrhenian Sea some distance from Lido di Roma is a different sight. Where the river widens, protected by stone jetties from stormy waves, are two airports: one military, the other a seaplane base of Alitalia, subsidized company monopolizing Italy's air transport.

Here a dozen flying boats sometimes ride at anchor or take off for Tunis (page 345) for east Africa—wherever turmoil and hurrying passengers would be flown. Here too are shops where I saw ships themselves repaired and built. The ground crew lives in a fair sized town.

I walked inland over the dunes where stunted Scotch broom and blackberry vines fought bravely for life and often failed. In swamps between grew yellow iris. There were purple flowers, miniatures of the lilac-hued wisteria that grows so profusely and decoratively over Roman balconies and garden walls in spring.

Farther inland on pitiful little farms women in white kerchiefs struggled mightily fertilizing every plant to make the risen sandy seashore provide a living. There were fields of giant beans. Italians often eat them green and raw like peas. Scrubby cows browsed in marsh grass contrasting with the handsome animals on reclamation projects farther up the Tiber Valley.

It was a bitter coast—not water enough in some places and frog-filled swamps in others. Everywhere were thin-shelled land snails—I counted 34 on a single little weed—contesting ownership of every leaf and blade.

At last I reached a road and then a cross road. A number of farmers had gathered in the bowling yard beside a trattoria. Children played walnuts in pyramids of four and tried to hit them from a distance by



Photograph by John Pair c

A GOOD SHEPHERD TENDS HIS FLOCK BESIDE ULTRAMODERN CITY APARTMENTS

He picked up his canine pal says the author so I would be sure to get it in the picture (page 308) Wearing a tattered military tunic the man pastures his sheep near the Tiber where one of Rome's new buildings contrasts with an older apartment house (right) Pastoral scenes are common near the capital for in Italy all available land is utilized Steel shutters of the new structure roll up like old fashioned desk tops

rolling other walnuts like marbles from a tawline

I watched awhile asked about the game in my simple Italian

You speak not Italian—English? asked a man who sat near by

I am American I said

Ah! he exclaimed, hurrying toward me with outstretched arms An American! Americans are the finest people in the world

He had taught Latin as a young fellow in Calumet, Michigan in Pittsburgh, and in Catskill New York

He was, he said, Professor Virgilio Scimmi tutor at Lido di Roma What a country America was! Had it changed much? He talked in English or to his com-

panions in rapid Italian recalling happy memories of a friendly land far across the seas whose people had been kind

This game? It's *castelletto* Roman children played it two thousand years ago Whoever wrecks a tower gets the four nuts and if no one succeeds on the first shot the boy whose taw rolled farthest shoots first next time

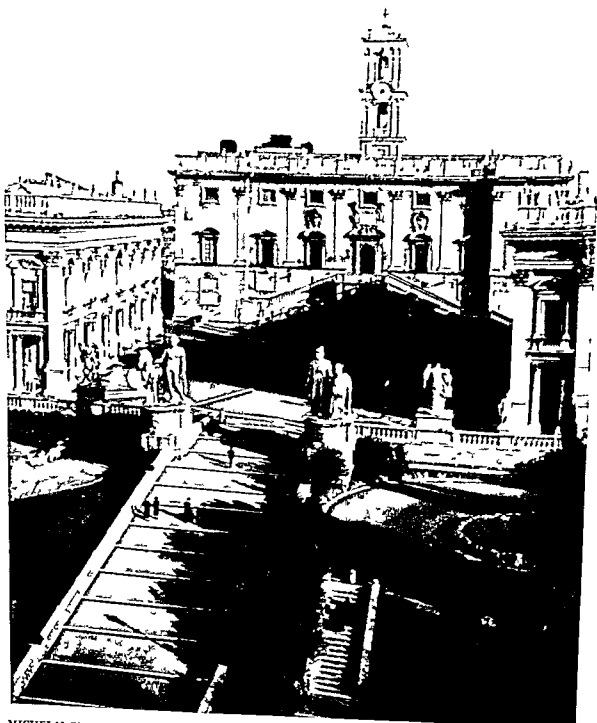
The old teacher motioned toward the trattoria

Come inside and eat, he said What do you like?

What is there, I countered, characteristic of Ostia?

Frogs are good he replied

I hadn't eaten frog legs since a happy day in Hawaii two years before



The engraving by Bernard F. Rogers, Jr.

MICHELANGELO'S GENIUS IS REFLECTED IN THESE FINE BUILDINGS ASTRIDE CAPITOLINE HILL. The old master designed the Capitoline Museum (left) containing a splendid collection of classical sculpture, the staircase in front of the Palazzo del Senato (background) and the Palazzo del Conservatorio (right) where is preserved the famous Etruscan she wolf (Plate V). Romulus is supposed to have founded Rome on this smallest but important of the Eternal City's seven hills.



Photograph by Bernard F. Rogers

PERHAPS A BEAST FROM THE COLISEUM SERVED AS MODEL FOR THIS RICH MOSAIC

Once the busy seaport of ancient Rome, Ostia now is isolated from the sea by silt brought down by the Tiber. Its uncovered houses, temples, theater, statues, fountains and shops vie with those of Pompeii in recreating the life of an ancient Roman city (page 302)



Photograph by LUCE from ENIT

PATRONS OF SIDEWALK CAFES MUST PAY A COVER CHARGE

Because the restaurateur is taxed by the city for using this outdoor space, customers must pay a premium for the privilege of sitting on the sidewalk of fashionable Via Vittorio Veneto. Flowers (loose or potted) are planted in pots and when the wilted ones take their place.



HERE AT VILLA TORLONIA LIVES ITALY'S FORCEFUL PREMIER

Il Duce's offices at the Palazzo Venezia are about two miles from this quiet retreat (page 269). Spacious grounds extend back for several acres from the ancient Via Nomentana. Born in 1883 at Predappio, not far from the Republic of San Marino, Benito Mussolini, son of a blacksmith, studied teaching and journalism as steppingstones to his present position as head of the State. Leader of Fascism in Italy from its start, he still writes novels and plays in his spare time.



Photographs by Ben and F. Rogers, Jr.

BEAUTY LEADS THE BEAST TO THE FLOWER MARKET

Daises, violets and chrysanthemums stacked on the donkey's back have been brought in from fields to Nemi, near Rome, for transshipment to the capital. Blossoms are so plentiful that vendors sometimes give faded ones to children who beat them on pavements to see the petals fly.

"If this were the feast of St John the Baptist, we'd have snails such as you saw in the fields. All Rome eats them then. We'd try them now, but they are not ready. To clean them we keep them unfed a day or two."

Neither of two dishes was frog legs. The first contained little cleaned frogs, whole, fried in olive oil. Then came soup of frogs, made with tomato broth and bread like my old favorite, *zuppa di pesce* (page 284).

I ate all they gave me. Delicate little frogs, fried, are to bull frogs' legs what fried spring chicken is to an old rooster's drumstick. They have wishbones too. But to eat them, eyebrow tweezers would be handy.

Scimmi and I walked back to Lido di Roma.

Ostia has about 6,000 people, he said, and as many as 60,000 in summer. Where you see Lungomare Cristoforo Colombo, that wide seashore avenue, duck hunters tramped dunes and marshes twelve years ago. Within the century Turkish and Algerian pirates landed here. That old watch tower was part of Rome's defenses.

There's still game along this coast—ducks, deer, and wild pigs. Laws are modified temporarily because of sanctions. Thursday and Friday are meatless days, but shops then have game, bought from hunters who may exceed former bag limits



Photograph by Bernard F. Rogers, Jr.

ROAD CLOSED TO COMMERCIAL VEHICLES

Showing a truck and a horse and cart, this circular sign, posted at an entrance to the Villa Borghese Gardens, is an international symbol used in many European countries. Prizes decorate the hat of this member of the Fascist University Groups.

but must sell their surplus at fixed prices. The season on quail—they fly from Africa—had been closed for two years. It is open now.

Four milk white horses drew an ornate white hearse. It's for a child, Scimmi explained, saluting it, as all good Romans do. If the deceased is over 12, hearse and horses are black.

Laboriously, as I awaited my train, I translated from a Roman paper. Legally limited to six pages, it reminded me of American small town dailies. Its comic strip was "Bringing Up Father."

Jiggs attended a highbrow party with Maggie. To the lorgnette equipped guest of honor, he said in Italian "I like your dress. My cook bought one just like it at Campo dei Fiori." There, on Wednesday mornings, is Rome's rag market.

BRIDGE LASTS 20 CENTURIES

North of Rome, in the crook of a sharp Tiber bend, where the Ponte Milvio stands, is the Flaminia district. Rows of new apartments rise in fields. Occupants, to visit Mussolini's Forum (page 278), cross the river on the old bridge, part of which has served Romans for 2,045 years.

For days came an influx of pilgrims, from far provinces, from all the Roman Catholic world. Hotels and boardinghouses were filled as lesser celebrations heralded Easter.

A priest and boy in lace-fringed white aprons flicked holy water about houses and stores with rapid blessings of the risen Christ. Even the irreligious say it is good, for householders, knowing when the priest will come, use the week before Easter for spring house cleaning.

I photographed and listened to a barrel organ, commonplace relic of an Italy the new regime deplores. I saw sheep grazing before one of Flaminia's new buildings, their herder ragged as shepherds can be. I gave him some tobacco. He was the friendliest, kindest, simplest fellow imaginable and wanted me to take his picture holding his little dog (page 303).

Because I did, two policemen took me to the station. While I was waiting there the priest came, blessed it, and passed on.

I was subjected to a searching inquiry. I am an enemy of Italy who would go away and say bad things, illustrated with photographs of bad people.

There are well-dressed people in the Flaminia, and new apartment houses with beautiful entrances. There are automobiles. There is even a park with statues in it. Why not photograph these?" they asked.

At last a note arrived from the Ministry of Newspapers and Propaganda. Well and favorably known. I was released.

Plain-clothes men have halted me on Rome's busiest streets to "see my papers." I was awakened in a hotel early one morning in a town unfrequented by tourists. Officers asked what I was doing there. Sometimes I was questioned on the street, sometimes in the police station. Four offi-

cial papers explained who and what I was and I soon learned not to fear consequences of being a well documented foreigner with a pocket camera. The custom of "controlling the population" became, to me, merely a time-consuming annoyance.

Mrs. Olivia Rossetti Agresti invited me to her home. I should have gone had she been just granddaughter of Gabriele Rossetti, Italian poet and liberal, who fled to England in a uniform lent by a British admiral.

It would have been interesting had she been only the daughter of William Michael Rossetti, biographer of Shelley, Blake, and Walt Whitman, or only Dante Gabriel Rossetti's niece.

Mrs. Agresti, born in England, has lived in Italy 25 years. She is now a delightful Roman of fame almost legendary, a writer with a sense of humor, two alert grandchildren, walls of mystically beautiful Rossetti water colors.

I should have gone anyway. The invitation was for Easter dinner.

ROME DINES WELL ON EASTER

"This, to us," she said, "is what Thanks giving is to you. You may feel honored!"

"I do," I said. I knew her from many deck chair days at sea.

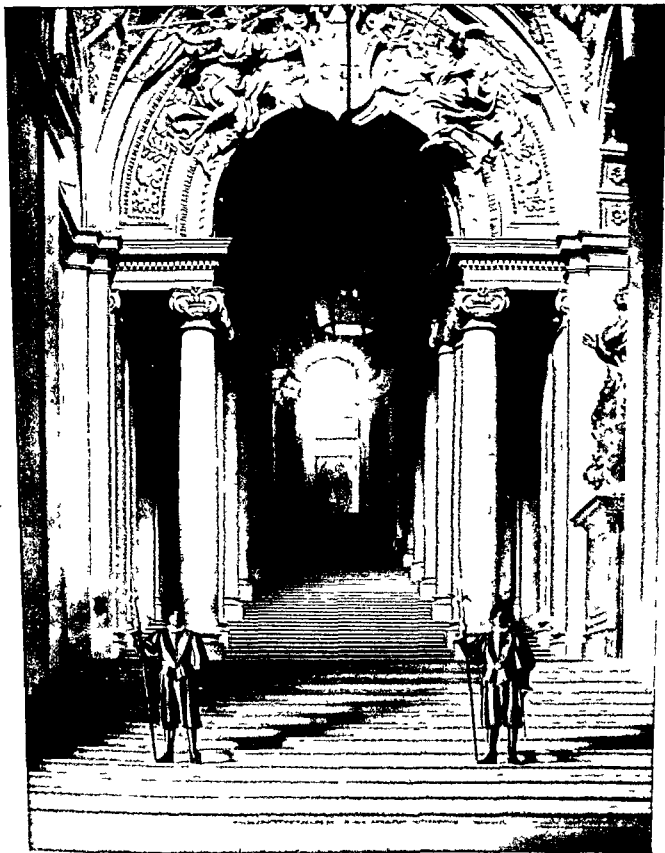
"This dark brown cake it isn't bread it's *pizza*. We always have it with salami and hard boiled eggs at Easter. Unless we are terribly poor the meat is *capretto*, or roast kid. Those bits you are picking from it so slyly, thinking them fir needles that fell in by mistake are rosemary leaves. They give that warm slightly bitter pungency.

Pure-white melted cheese called *mozzarella* stretched indefinitely in filmy strings like chewing gum, while hot, and became rubbery as it cooled.

That's made from milk of water buffalo," my hostess explained, a draft animal common on farms where it may wallow in marshes or rivers.

I don't blame your people for thinking Mussolini ruthless she said. Those stern bronze busts and unsmiling pictures Americans see make him look Julius Caesar at his worst. I often tell the Government so but the idea seems to make him appear an iron dictator. Personally unselfish, really most human, he probably works hardest of all Italians. I know about that—I went with him recently to the Stresa Conference.

I said I had been that morning at St. Peter's in the Vatican.



© National Geographic Society

Finlay photograph by Bernard F. Rogers Jr.

AS IN THE DAYS OF MICHELANGELO SWISS GUARDS OF THE POPE
STAND SENTRY IN THE VATICAN

The famous artist is supposed to have designed this uniform of the halberdiers who have guarded the papal residence since 1503. When a Pontiff dies the College of Cardinals elects one of its members to be his successor. Pius XI was elected in 1922 the 261st Pope to head the Roman Catholic Church. Down this Royal Staircase (Scala Regia) the Holy Father in solemn procession walks to the adjoining Church of St. Peter. The wall telephone (left) is typical of the Vatican State's modern equipment which includes radio, printing office, electric plant, railroad station and special papal train.

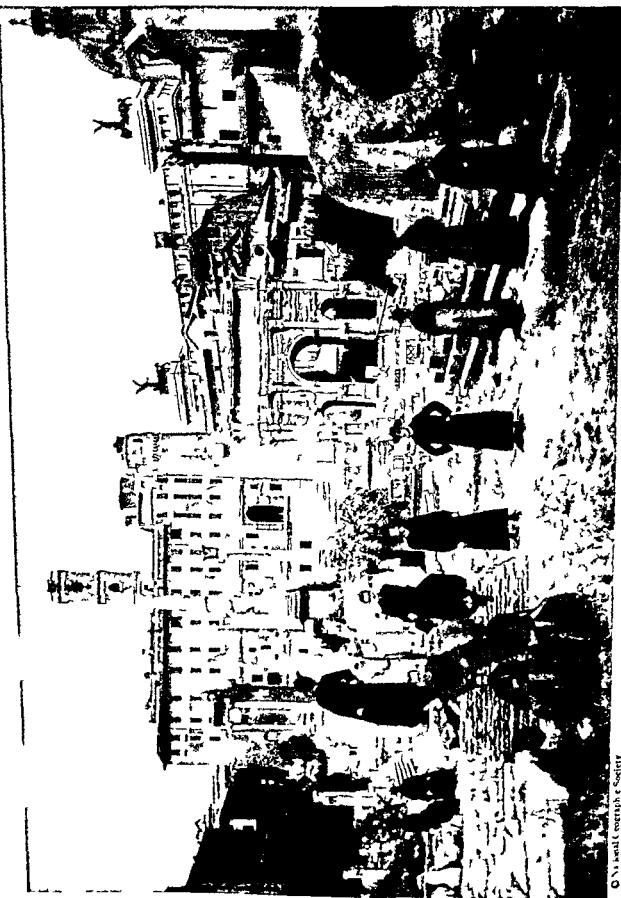


© National Geographic Society

BRILLIANT STUDENTS ALL ARE THESE BOYS OF THE GERMAN HUNGARIAN COLLEGE

Autochrome Lumiere by L. G. L. L. L.

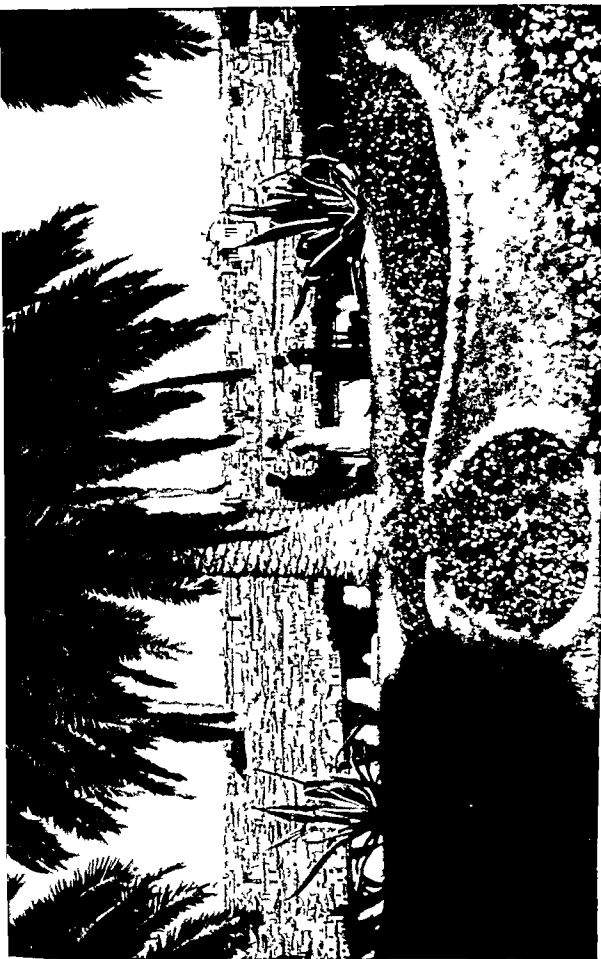
Because of their scarlet cassocks Romans call them boiled lobsters Here they gather after Mass in the courtyard of the College second oldest in Rome The Holy City has many institutions in which Catholic students from all over the world are trained for the priesthood One can tell by a youth's dress whether he belongs to the American College the Belgian the Irish or some other



Q. N. Smith (Geography & Society)

TOX AED RO IANS ONCE CROWDED THE FORUM WHERE THESE STUDENTS IN BRIGHT CASSOCKS STAND
 Here in the ancient city's heart Cicerone harangued the citizens and the very same led throngs in pagan rites and Caesar ruled the world
 Left columns of the Temple of Saturn (left) and the Arch of Septimius Severus (right) contrast with the modern National Monument

Autochrome Lumière by Luc Fellerano

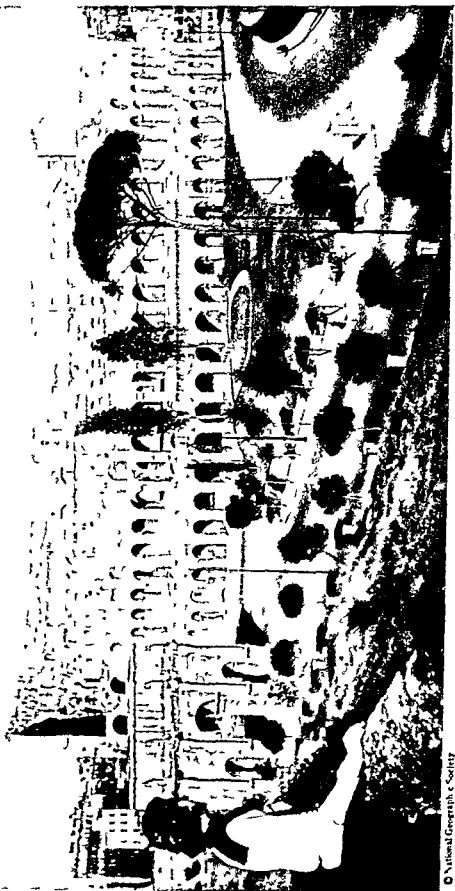


© National Geographic Society

FROM A PALM SHADED TERRACE TRAVELERS MARVEL AT THE VAST ETERNAL CITY SPRAWLED ON HER SEVEN HILLS

May 11 photograph by Bernard F. Rogers, Jr

To lay Poe's famous line should read: The grandeur that is Rome for new buildings have been erected and old ones restored. On the Capitoline smallest of the historic hills the campanile of the Palazzo del Senato towers above the horizon to the right of the gleaming National Monument (opposite page). Near these flower beds on Monte Gianicolo the redshirts of Garibaldi defended Rome against the French in 1849. From the walled promenade strollers overlook the Tiber flowing near the base of this steep elevation which Romans named Janiculum in honor of Janus god of gateways



© National Geographic Society

Today Photograph by Bernard F. Rogers Jr.

WICKED WONDERFUL OLD CITY.

He pictured the amphitheater 'as it used to be with thousands of eager faces staring down into the arena and such a whirl of strife and dust going on there, as no language can describe.' At its inauguration A.D. 80 about 5,000 wild beasts were killed in 'games' lasting 100 days, and the arena was flooded for mock naval battles. Here 50,000 spectators saw gladiators fight and Christians die as martyrs. The ancient triumphal arch on the recently paved Via del Trionfo (left) commemorates a victory of Constantine the Great, who in 313 gave Christians their religious freedom.



Finlay Photographs by Bernard F. Rogers Jr.
ALL DRESSED UP FOR A ROMAN HOLIDAY

This jolly salesgirl keeps her choicest grapes in paper packages (left). Celebrations like the annual Grape Festival are often staged by the *Dopolavor* ('after work') organization, which supervises sporting events, dramatics, courses of study, and other activities for the worker's leisure.



© National Geographic Society

ROSES FOR THE GRAPE FESTA

Italian girls have their own Fascist organizations corresponding to those of the boys. They don black skirts at six, and at 17 join the Young Fascist Girls group in which courses in domestic economy, stenography, farming, and other practical subjects are combined with sports and drill.



© National Geographic Society

Enlarged photograph by Leonard F. Rogers, Jr.

"LOYS ONE OF YOUR ROMAN ANCESTORS MAY HAVE CARVED THIS SARCOPHAGUS"

The pretty mentor might add: "And perhaps the model for the sculptural general behind you, the legions to fight the Parthians. These reliefs stand outside the Casino of the Villa Borghese (Villa Umberto I) built about 300 years ago by Cardinal Scipio Borghese, whose lavish hospitality gained him the nickname 'Rome à laight.' The Casino, housing one of the capital's finest art collections, became public property when the vast estate was bought by the Italian Government in 1902."

"Sixty thousand is not unusual Easter attendance," she said, "and didn't you understand more fully why we call ourselves 'catholic,' implying 'universality'?"

"Yes," I replied. "Fine gowns rubbed elbows with old peasant clothes. I saw representatives of the races of mankind, and no inequality in worship of a common ideal."

"Cardinals once met in a church at *Vi terbo* to elect a pope," my hostess related. "When proceedings had dragged fruitlessly for months, peasants removed the roof, knowing rain would hasten election. It did."

I told her of my experience with the police.

"I've heard of others," she said, laughing. "Italians, supersensitive, often think foreigners are criticizing."

JOB HUNTERS NEED CERTIFICATES

"You aren't as patient as Italians. Applying for a job here, a man must have a certificate of good conduct, military papers, birth record, and even a penal certificate recording all his trouble with the law. Blank ones are best."

There came a genial old woman in humble dress, bearing a letter. Mrs. Agresti read it aloud, rapidly, in Italian.

"Can't she read?" I asked.

"Some. But this is in English from her little American grandson. I translated as I read. We've been friends 20 years. Her husband is a retired corset maker who still makes mine as a favor. They live in a modest \$10-a month apartment."

"That's the life I want to see. I said. Can you get me a dinner invitation?"

"We'll both go. I'll ask her when."

On the evening we agreed upon I called for Mrs. Agresti at her office, across Piazza Venezia from Mussolini's. We've gone back to the long midday siesta, she said, so I worked till eight. They abolished it this winter to save lights and coal. We'll probably return to it only in summer. Sanctions taught us much.

Pictures of the corset makers' family hung in ornate frames. Abundant furniture was more generously proportioned than rooms that held it. Everywhere were cherished knickknacks, gifts of Uncle Eduardo or Aunt Elisabetta. Dusting the dining room must have been a long job, but it had been done.

The dish-of-the-dinner was *pasticcio di*

maccheroni, baked round and big and brown. In it must have been two dozen eggs and several pounds of cheese. Our hostess proudly removed a generous helping and vanished out the door, leaving fragrant wisps of steam behind her.

"She's taking it to a neighbor, an expectant mother," explained Mrs. Agresti. "If she didn't share such a dish, the child might be ill."

"Buon appetito!" said everybody, when all was ready.

Mrs. Agresti's wine accidentally spilled. "Allegria! It brings good luck."

We had "artichokes Judea," boiled in olive oil, and *nespole* (medlars), a sour-sweet fruit the size and color of a yellow plum with three free, smooth, chestnut-shaped seeds. Small trees, common near Rome, bear early and heavily.

"We've just celebrated our golden wedding," said the old corset maker. "You never do in America."

I contradicted him.

"I don't believe it!" replied his wife, firmly. "Americans are divorced long before fifty years'."

"Do men in America," asked her nephew, "wheel baby carriages?"

Some American husbands, I said, were so considerate.

"Everybody would laugh if I were," he replied, shaking his head at so queer a custom.

"Is it true that many Americans, all strangers, all undress and sleep together in one room on a train?"

I described night life in a Pullman.

"What a strange country, America!" he exclaimed in awed wonder.

Another friend, Arrigo Usligh, who made American films speak Italian, had a little Lancia car, and promised to meet me one afternoon on Via Appia Antica.

"LORD, WHITHER GOEST THOU?"

I started afoot, in the morning. Where anciently was one Appian Way, today there are two. The narrow old one near Rome could not be widened for modern transport without destruction of relics such as the Church of Domine Quo Vadis.

It is built where Saint Peter, fleeing Nero's persecution, met Jesus face to face.

I saw a print of a bare foot in the stone where Christ had stood; they said it was a reproduction of His original footprint now in the Church of St. Sebastian.



Photograph by Bernard F. Rogers, Jr.

PLOW OXEN EMERGE FROM THEIR SIDE OF THIS TWO-FAMILY HOME

Ninety-five per cent of the population of the Pontine area was infected with malaria. Wild boars roamed where cattle graze today. Now several thriving towns stand the drained plain (page 270). Farmhouse 121 near Littoria was built ANNO X E F — tenth year of Fascism.



© Donald M. Lewis

KERNELS OF MAIZE NOT COFFEE BEANS DRY HERE IN THE SUN

Laborers live comfortably in the up-to-date building (background) in the Maccarese, a vast area of reclaimed swamp land. In 1936 the Nation harvested three and a third million tons of corn.

This church is built over ancient catacombs cut in tufa—volcanic rock—under the villa of some old Roman sympathetic with early Christians. What a task to carve that maze of passages, those crypts in living rock where bones still crumble!

In little chapels worshippers fired by a zeal that only persecution gives and prayers by torchlight and then emerged into the night carrying bits of excavated rock to throw away covertly lest unbelievers discover their subterranean rendezvous.

Into gloomy tunnels through an air vent—an iron grill in the church floor—filtered faint and far away organ music and chants.

When I came to the surface where sunlight streamed into the chapel through stained glass windows I saw a dozen girls of ten or twelve learning to sing. Their clothes were simple and somewhat tattered—people who live on Via Appia Antica are not as rich today as of old. Many wore castoff high heeled ladies' shoes.

Automobiles their speed unlimited by law roar along Via Appia Nuova but the old road is used for slower traffic reminiscent of days when it was new. Oxen pull big carts peasant women carry bundles on their heads. Brightly decorated big wheeled wine carts return empty to high Frascati far away, their drivers soundly sleeping as horses jolt along the road they know so well. Instinct I thought. How many generations of the same horses and the same wine sellers have taken that weary road to Rome. (Plate VII.)

Stone walls, red poppies in their crevices hide much of the rolling Campagna on either side until at last the road emerges into open fields and meadows where occasional heaps of stone and brick are remains of huge buildings.

In the distance are aqueducts. To William Dean Howells they seemed to stalk down from the ages across the melancholy expanse like files of giants with now and then a ruinous gap in the line as if one had fallen out weary by the way.

A boy of five trudged along. I fell into step. He tenderly carried a tin toy army tank, battered and broken. Its rubber treads were gone. Yet you could see it was a tank—a gun still poked from its turret and the camouflage had not all worn off. Presently he deposited it on a pile of scrap iron in a yard near the road.

Befana brought it, he said, a long time ago.

Befana is an old lady who in the manner of Santa Claus comes on a January night bringing toys to good boys and girls. She pinches bad ones.

Children during economic sanctions brought bits of metal to school to be collected and fabricated for national defense. One mother missed pot covers, another her flatiron. Householders often rummaged piles of patriotic salvage for kitchenware.

There are certain streetcar pins resting loosely in sockets. These disappeared with fishplates and spikes that lay handily beside operations of construction crews gone to lunch. Traction company men retrieved its equipment after Roman contributions were collected.

SONS OF THE WOLF

'Sons of the Wolf' at six young Italians are never thereafter outside Fascist organization. Schools increase instilling childhood beliefs that individual freedom and private rights are always subordinate to duty and sacrifice to the State. The younger generation is devoted to Fascism with all the passion of its Latin blood. (Plates III, IV, VI and pages 270, 280, 281.)

I watched men playing *barottello*. Graphically this game solved a mystery—why copper ten centesimi pieces in Rome are so often battered and bent. Scarcely one in a dozen would fit a slot machine.

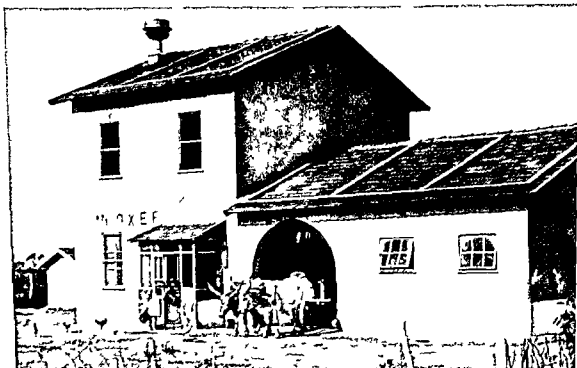
Six or eight players stacked coins on a stone, retreated ten paces or so and pitched a rock apiece at the heap. Advancing each recognized his own missile and took what money if any lay nearest it. Straws broken off in bits to become almost caliper like in accuracy measured disputed distances.

I rested on a fallen stone below a tomb erected in Augustan days by Crassus, millionaire of his time for his wife Metella. Ughigh arrived in his Lancia car bringing Tucci with him.

We followed the ancient Appian Way to its junction with the new. Glimpsing a ragged old wanderer cooking in a tin can by the road, I persuaded beauty-loving Ughigh patriotically reluctant to assist to halt for a photograph.

The tramp greeted me in English. I'm American too, he said. The Italians laughed uproariously.

My countryman talked familiarly of freight trains in the American West. Even Italians always give a guy a handout, an



Photograph by Bernard F. Rogers, Jr.

PLOW OXEN EMERGE FROM THEIR SIDE OF THIS TWO-FAMILY HOME

Ninety-five per cent of the population of the Pontine area was infected with malaria. Wild boars roamed where cattle graze today. Now several thriving towns stud the drained plain (page 270). Farmhouse 121 near Littoria was built ANNO X E F — tenth year of Fascism.



© Donald M. Cook

KIBNIES OF MAIZE, NOT COFFEE BEANS, TRY HERE IN THE SUN

Labourers live comfortably in the up-to-date building (background) in the Maccarese, a vast area of reclaimed swamp land. In 1936 the Nation harvested three and a third million tons of corn.

This church is built over ancient catacombs cut in tuff—volcanic rock—under the villa of some old Roman sympathetic with early Christians. What a task to carve that maze of passages those crypts in living rock where bones still crumble!

In little chapels worshippers fired by a zeal that only persecution gives said prayers by torchlight and then emerged into the night carrying bits of excavated rock to throw away covertly lest unbelievers discover their subterranean rendezvous.

Into gloomy tunnels through an air vent—an iron grill in the church floor—filtered faint and far away organ music and chants.

When I came to the surface where sun light streamed into the chapel through stained glass windows I saw a dozen girls of ten or twelve learning to sing. Their clothes were simple and somewhat tattered—people who live on Via Appia Antica are not as rich today as of old. Many wore castoff high heeled ladies shoes.

Automobiles their speed unlimited by law roar along Via Appia Nuova but the old road is used for slower traffic reminiscent of days when it was new. Oxen pull big carts peasant women carry bundles on their heads. Brightly decorated big wheeled wine carts return empty to high Frascati far away their drivers soundly sleeping as horses jolt along the road they know so well. Instinct I thought. How many generations of the same horses and the same wine sellers have taken that weary road to Rome. (Plate VII)

Stone walls red poppies in their crevices hide much of the rolling Campagna on either side until at last the road emerges into open fields and meadows where occasional heaps of stone and brick are remains of huge build ngs.

In the distance are aqueducts. To William Dean Howells they seemed to stalk down from the ages across the melancholy expanse like files of giants with now and then a ruinous gap in the line as if one had fallen out weary by the way.

A boy of five trudged along. I fell into step. He tenderly carried a tin toy army tank, battered and broken. Its rubber treads were gone. Yet you could see it was a tank—a gun still poked from its turret and the camouflage had not all worn off. I resented he deposited it on a pile of scrap iron in a yard near the road.

Befana brought it he said a long time ago.

Befana is an old lady who, in the manner of Santa Claus comes on a January night bringing toys to good boys and girls. She pinches bad ones.

Children during economic sanctions brought bits of metal to school to be collected and fabricated for national defense. One mother missed pot covers another her flatiron. Householders often rummaged piles of patriotic salvage for kitchenware.

There are certain streetcar pins resting loosely in sockets. These disappeared with fishplates and spikes that lay handily beside operations of construction crews gone to lunch. Traction company men retrieved its equipment after Roman contributions were collected.

SONS OF THE WOLF

'Sons of the Wolf' at six young Italians are never thereafter outside Fascist organization. Schools increase instilling childhood beliefs that individual freedom and private rights are always subordinate to duty and sacrifice to the State. The younger generation is devoted to Fascism with all the passion of its Latin blood. (Plates III IV VI and pages 270 280 281)

I watched men playing *barottello*. Graphically this game solved a mystery—why copper ten centesimi pieces in Rome are so often battered and bent. Scarcely one in a dozen would fit a slot machine.

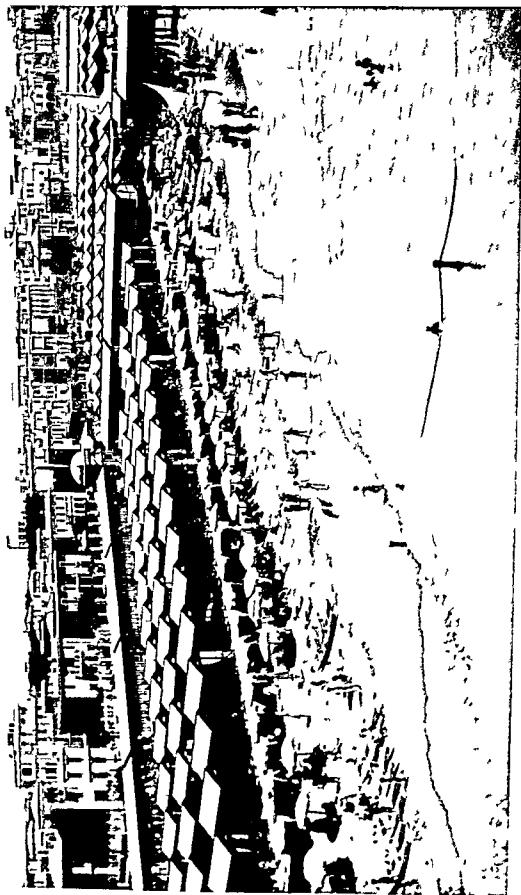
Six or eight players stacked coins on a stone retreated ten paces or so and pitched a rock apiece at the heap. Advancing each recognized his own missile and took what money if any lay nearest it. Straws broken off in bits to become almost caliper like in accuracy measured disputed distances.

I rested on a fallen stone below a tomb erected in Augustan days by Crassus millionaire of his time for his wife Metella. Usigli arrived in his Lancia car bringing Tucci with him.

We followed the ancient Appian Way to its junction with the new. Glancing at a ragged old wanderer cooking in a tin can by the road I persuaded beauty loving Usigli patriotically reluctant to assist to halt for a photograph.

The tramp greeted me in English. I in American too he said. The Italians laughed uproariously.

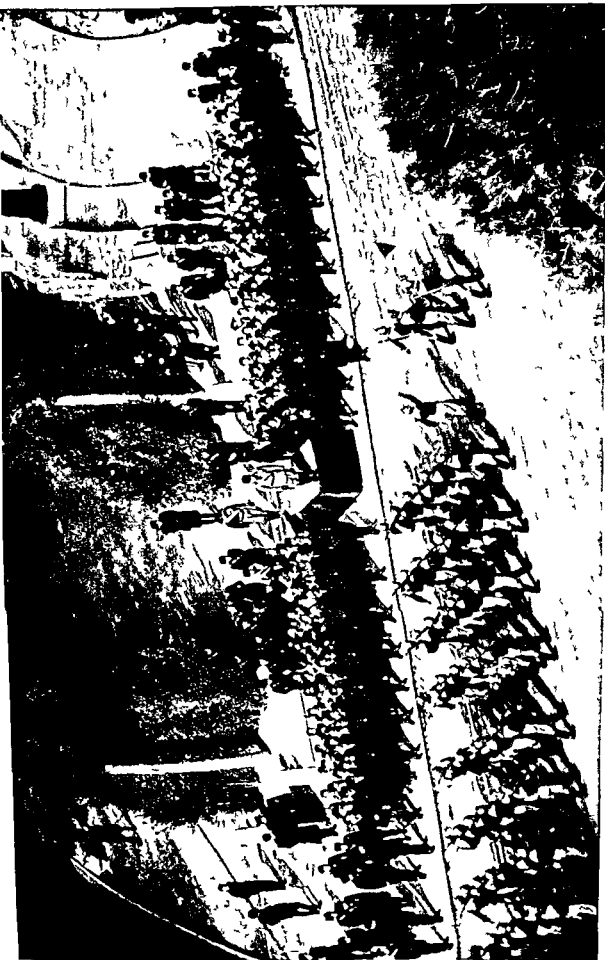
My countryman talked familiarly of freight trains in the American West. Italians always give a guy a handout and



1 photograph by LUCCI FORTIN

SUN, SEA AND SAND TOWN WEARS THOUSANDS TO LIDO DI ROMA, ATLANTIC CITY OF CENTRAL ITALY

In auto speedway or fast electric cars Romans reach it is new resort in half an hour from the capital (page 307) Long low buildings in the background are public bathhouses In front of these are cafés and umbrella tents used for dressing Drawn up on the beach at the left are small surf skiffs Not far from here is the seaplane base from which flying boats sail for Tripoli Tunis Athens Fes and I (by connection) for Lilla and the Far East



Photograph by Bernard F. Rogers Jr.

ARMED STUDENTS DIP THEIR COLORS TO IL DUCE

From the dais flanked by a guard of helmeted militiamen, Mussolini reviews members of the Fascist University Groups on the Via del Mare below the National Monument (Plate I and page 271). Students up to 26 years may join this huge Government sponsored fraternity. Their activities include social service, sports training and study of the aims of Fascism.

you don't hafta chop no wood,' he said
'Course, you can't ride no freights

As we left, I shut the Lancia door with a bang and a crackle of breaking shatter proof glass. Usigli, laughing again showed me how, pushed shut with finger pressure, this door touched a hair trigger, releasing a heavy bolt that clicked dully into place from above.

I would come to Italy, would I, looking for 'local color' and boasting of America's mechanical progress? Usigli was reluctant to accept five dollars for new glass. "My fun is worth more," he said.

We drove to high Albano (page 275), and to a lake rim road above it, sunken by use and erosion a yard or two below roots of gnarled and knobby old trees beside it.

As we stood surveying the deep blue Lake of Albano far below—a miniature of Crater Lake, in Oregon (page 327)—an old peasant addressed us in timid friendliness.

'Over there, he said, pointing, 'the Pope lives. At the word *Papa* he took off his hat, replaced it as he continued. "It is Castel Gandolfo, and cool in summertime. *Papa*—off came the hat again—is an old man."

We encouraged him. Invariably he doffed his hat at mention of the Holy Father. 'Over there, he went on, pointing to the precipitous opposite shore, was a city once, Rome's enemy. An earthquake threw it into the lake."

GHOSTS ROAM LAKE SHORE

There were ghosts, he averred.

I've seen a man with a white dog, rising out of the water on foggy days. He walks in the woods when I go near he vanishes. I think he lives in that old city in the lake.

We went to Frascati perched on a hill top. Auto rides of Romans often take them there. The Campagna seems a purple sea on days like that, when Rome itself is nearly hidden by the haze.

Interested in the community laundry, I found it by following a young woman with the week's wash on her head. Children tagged behind her. They liked the laundry, somebody was always there to play.

Forty women worked and gossipied in a large roofed-over enclosure. Using rough yellow soap they rubbed and pounded clothes on the inwardly slanting top of a wide wall circling a concrete wash tank. Water poured in from a smaller rinse tank on a slightly higher level where it had come directly from the town supply.

That night I went to the opera house in Rome. My seat in the topmost gallery cost about a dollar. Only there could I sit without full dress. Prices for that performance went to 400 lire (\$32) for boxes.

On the ceiling swans, mermaids, peacocks, cherubs, leopards, Egyptian slave girls, and Roman warriors cavorted around a glittering, ornate crystal chandelier as big as the dome of the county courthouse back home. Sixteen others might have been squeezed into as many moving vans. Around gilded tiers of boxes were perhaps 200 still smaller chandeliers.

Directly below me, projecting from the others, was the royal box, surmounted by an enormous golden crown. Eighty musicians sat in the pit. I had never before seen such awful magnificence and gave scant attention to the far off opera.

There were gorgeous gowns and flashing jewels, snowy shirts and feather fans. Everyone went out between acts for a promenade. Yet not even where I sat did I see one workman's face.

Peasants I had seen on the Appian Way would here have been as out of place as a soldier in the Officers Club of Rome, where ballrooms, cinema, sumptuous leather easy chairs, books, lights, velvet hangings, fine paintings, champagne, and splendor fill what once was Barberini Palace.

Then I recalled the up-to-the-minute tuberculosis sanitarium I had visited on the Roman Campagna. In the Carlo Forlanini Hospital Italy supplied humblest citizens with up-to-date treatment for a disease long weakening a nation fighting to be strong.

I recalled too, a day of rambling about the modernistic plant of the University of Rome (page 276). I saw Marconi there. Not even he is too great to lecture to University classes.

Yet Enrico Fermi, physicist who discovered Element 93, could name for me few scientists in Italy who were sons of artisans. It was difficult for peasants' sons to go to the University.

I know they can in America. That's a fine thing about your country, he said. 'Many work their way here, but the State cannot yet afford to educate everyone. Italy is still too poor.'

We must have a strong leader,' said a Fascist to me, for Latins are not Anglo-Saxons. Before Mussolini we had 50 political parties. In America, when many want theater tickets or postage stamps or



1 photograph by Fritz Henle from European

VAST ST. PETER'S PLAZA COULD HOLD THE POPULATION OF A GOOD SIZED CITY

Huge colonnades surmounted by 162 colossal statues of saints embrace the broad elliptical court, master piece of the architect Bernini, who directed its construction in the middle of the 17th century. Wind-blown spray has made a dark, wet shadow to one side of the fountain (upper left). Points of the compass marked on the pavement around the soaring obelisk help confused strangers to orient themselves. Behind the camera was St. Peter's largest church in the world.



Photograph by Bernard F. Rogers, Jr.

CURIOSITY DRAWS A CROWD AROUND THE CAMERAMAN

The photographer relates: "When I lifted the focusing cloth from my head in the Piazza Vittorio Emanuele where I had been trying to take a color photograph from the rumble seat of my car I found these young Romans had unwittingly composed a far more interesting picture."

change at the bank, you form in line by habit. Here it's every man for himself." Ambitious and forward looking are the works of Fascism, dated like its controlled newspapers, with the year—this is the 15th—of its rise to power.

PEOPLE PAY FOR PROGRESS

Interesting to me was the cost. How did this Government finance itself? For anyone to have talked "taxes" in one good lecture might have been construed as destructive criticism, and that is frowned upon. So I learned of only some of them.

Much revenue comes from Government-operated railways, post office, and communication systems, and from tobacco, match, and salt monopolies. Railway fare is reduced on many occasions, but the regular first class rate from Rome to Naples, 141 miles is \$8.80 first class, \$5.81 second class, and \$3.52 on the hard wooden seats of third class cars. In the United States, coach fare for 141 miles is now \$2.82.

Letters sent abroad cost ten cents, postcards six. Domestic letters are four cents.

An American tobacco buyer told me the

content of the best Italian cigarettes, costing forty cents for twenty, was less expensive than in American ten cent brands. Other kinds are packed in containers for ten, die cut from rough wrapping paper often imprinted with advertising.

A can of unstemmed smoking tobacco, somewhat more than an ounce, costs 44 cents. "Penny boxes" of matches sell at two cents, and book matches about the same.

"We get five percent commission on cigarettes, but must handle postage stamps," said a tobacconist. "Business license and tax take much of our profit." I was buying a two cent refill for my automatic lighter. Tax on the lighter itself would have been \$1.60 had I lived in Italy.

A revenue stamp, costing almost two cents and called a *marca di bollo*, must be used on written documents like hotel bills, statements, and even restaurant checks. It is required on every handbill, for rent sign, even on tiny window show cards.

"This hotel register cost \$40 for taxes," explained the operator of a boardinghouse, "based on the number of its names."



Photograph from Fotol

THESE STACKS OF IRON BANDS WILL SOON REPLACE WEDDING RINGS

To bolster gold reserves during the Ethiopian War thousands of ounces of gold—wedding rings and other jewelry even false teeth—were contributed in response to the Government's plea. Fascist officers here direct the exchange of new rings for old.

Gasoline before the Ethiopian war sold at about sixty cents a gallon. When I was in Rome the price was \$1.24 and cylinder oil was in proportion. Horse and buggy days were returning. Horse drawn cabs were as common in Rome as motorized taxis.

I pay a fifth of my wages in income tax, a ship's engineer told me, but of course the rich pay much more. What used to go for my bachelor's tax helps buy clothes for my wife.

Balconies jutting so commonly from building and apartment fronts and driveways crossing sidewalks into private property are taxed. At the limits of Italian cities are highway offices called Consumer Impost where revenue from farm products is collected. Wine pays about one hundred per cent. Pork for example is taxed too.

Coffee prices ranged near \$1.25 a pound and sugar about 25 cents. All Italy likes coffee and shops use live steam under pressure to extract every bit of flavor from finely powdered long roasted berries (Pilate VI). In Rome about five cents is the price of a cup containing seven teaspoon

fuls of sweetened black fluid. I measured it.

I bought my Italian lire for a shade under eight cents and this bank rate I have used in these figures. Letters of credit sold abroad at a reduced price to obtain foreign funds were not yet available.

I told a Florentine as we sat in a sidewalk cafe that I still did not understand where all the money came from. The works of Fascism are so many and most people are peasants who do with few taxable luxuries.

They pay all they can. We all do. I replied this patriotic Italian. Our family was ten times richer 15 years ago—but those were troubled days. Italy is becoming great again. My *bambino* will see!

If having paid small income tax we have servants and automobiles and go in summer to the mountains the assessor knows we must pay more.

Everyone pays justly. Dog taxes are an example. Watchdogs cost only a little; hunting dogs are more.

A tiny Pekingese went by at the end of a fine lady's leash.

Such dogs pay most of all!

you don't hafta chop no wood," he said.



MERCED RIVER, BORN OF MELTING SNOWS, PLUNGES INTO YOSEMITE VALLEY IN A STAIRWAY OF GRACEFUL FALLS

One of the giant "steps" in the river's canyon is Vernal Fall, over which water cascades 317 feet (foreground). Upstream the river pours over Nevada Fall, at the right of Liberty Cap (center), in a tumble greater than that from the top of the Washington Monument. Beyond, in the distance, rises the high Sierra. Visitors are halted at a turn on the road to Glacier Point.

CRATER LAKE AND YOSEMITE THROUGH THE AGES

By WALLACE W ATWOOD, JR

With 13 paintings by Eugene Kingman

TO THE Klamath Indians, who lived long ago in the Cascade Range of southern Oregon, jewel like Crater Lake in its massive rock setting was a weird and ghostly amphitheater where the gods were forever embroiled in conflict, sporting in the blue waters and dwelling on the highly colored crags of the crater rim. Rarely did these early inhabitants visit the lake, for they believed it to be the home of the gods, not to be molested.

Rumors of the existence of a deep blue lake early reached the ears of Oregon miners, but its location remained unknown until June 12, 1853, when John Wesley Hillman, leader of a party of prospectors, found the hidden waters.

News of the discovery of Crater Lake spread rapidly throughout the West, but only a handful of travelers made the arduous climb to the crater's rim before the close of the century. In 1902 the area was set aside as Crater Lake National Park, good roads were constructed up the mountain, and now each summer thousands of visitors from near and far view its pastel waters.

A DRAMA OF THE ICE AGE

Like other visitors to Crater Lake, I was impressed with its deep blue color and the rare beauty of the precipitous crater walls. But more than that, I wondered how the unique setting had come into existence. What story of earth history was hidden away in the massive rocks which formed the crater rim?

I recalled that Joseph S. Diller, of the United States Geological Survey, had studied the area many years before. After many weeks he had reached the opinion that a large volcano had collapsed to produce the basin now occupied by the lake. Was he right? Could a mountain top disappear and leave a huge caldera more than 4,000 feet in depth?

As a member of the scientific staff of the National Park Service it was my duty to unravel further the geologic story buried in the rocks surrounding Crater Lake. From my tent tucked away beneath the branches of a mountain hemlock close to the rim

I could see the lake far below me. Each shift of the winds that ruffled the water produced new shades of blue, and drifting clouds floating high overhead sent shadows racing across the ever-changing picture. When darkness shut off the view, a night-hawk's call alone broke the silence.

The morning sunlight just touched the water as I worked my way along the rim to the Ranger Station. A welcome surprise awaited me there. "Hello, Doc, what brings you here?" came the familiar voice of my old friend and associate, George Grant, the chief photographer for the National Park Service.

I promptly asked him to join me for the day. "Sure will," was his hearty reply.

Maybe I can take some pictures for you.

Nothing could be better. Not venturing to ask outright for his services as a photographer, I had been secretly hoping he would bring his camera.

Within a few steps George saw his chance for a first picture. While he set up the tripod, I clambered down the steep slope of the crater rim. Suddenly I stopped. Before me was a grayish clay containing rounded boulders of many sizes.

Had I seen this in New England, or in some high mountain valley of the West, I might have given it a casual glance, but here on the steep lava walls surrounding Crater Lake it brought me to a sudden halt.

FINDING GLACIER FINGERPRINTS

Immediately I was on my hands and knees examining the material. The boulders were covered with scratches called striae, and many of the smaller stones were highly polished.

These and the glacial till* before me were sure indications of former glaciation, and yet I was inside an ancient volcanic crater from which hot molten rock had once issued. How was I to explain this circumstance? A mystery story was unfolding. To the geographer these scratched stones were clues akin to those that Sherlock Holmes would seize upon.

* Glacial till is a mixture of stones, sand and clay deposited by a glacier.



A PARA NATURALIST TELLS THE STORY OF CRATER LAKE

The operation by Grant courtesy National Park Service

To many of it is the morning hikes along the rim are highlights of the trip. Rangers who have studied the geology of the area explain rock formations and answer questions. Wizard with his barren top above the trees looks like a young volcano growing up in the caldera left when Mount Marwin disappeared (page 332 and Color Plate III).



The rocky hills of the Sierra Nevada

VERTICAL CLIFFS OF YOSEMITE WERE PRODUCED BY STORMS AND ICE SHEETS OF THE AGES

El Capitan (left) and Cathedral Rocks opposite tower far above the park's lowland where the Merced now wanders peacefully through rich meadowland (Plate VII). Lofly away from waterfalls such as the Bridalveil Fall (right) and even the steep walls of the canyon. Unknown to the white man in the early part of the 19th century it was the stronghold of Tenaya, leader of the Yosemite Indians. Captain Boling of the Mariposa Battalion discovered it on March 21, 1851 when he pursued the chief and his warriors to the river. Congress made it a national park in 1890.



Photograph by Albert W. Steens

AN AIRPLANE VIEW REVEALS THE SECRET OF HALF DOME

From aloft the observer can readily understand how Yosemite has been carved out of the high Sierra by rivers of ice and water (page 343). Cliff faces of this bald giant towering nearly a mile above the valley show clearly the marks of the glacier which carved them.

Just then I remembered my friend on the rim and shouted for him to come down. With some difficulty George and the camera reached the level where I was working. We photographed the evidence and continued the search for more.

A ROCK SANDWICH TELLS A STORY

Our glacial till appeared as sandwich filling spread between two layers of lava rock. On the layer beneath the till we found deep scratches produced by a rock-shod glacier as it moved slowly across the lava surface. Where did this glacier come from, and why was material once carried by the ice now sandwiched in between layers of lava? If we could answer these questions, perhaps we could unravel the story of Crater Lake.

During the next few weeks we searched the crater walls from top to bottom. It

was not easy to negotiate jagged lava cliffs, but thanks to a strong rope and well-hobbed shoes we completed the work without serious mishap. Our adventures were not in vain for we found not one but several exposures of glacial material, some of them buried beneath a thousand feet of volcanics.

Like leaves in a book, these geologic formations told a story of periods of vulcanism separated by periods of glaciation.

In a few localities charred remains of trees are interbedded in the volcanic rocks. At one place we saw the trunk of a tree preserved in its original upright position. These records indicate long time intervals during which soils formed, flowers bloomed and trees flourished, later to be destroyed when molten rock and volcanic ash buried the landscape. Some day, when the carbonized remains are accurately identified by the paleobotanist, we may know much

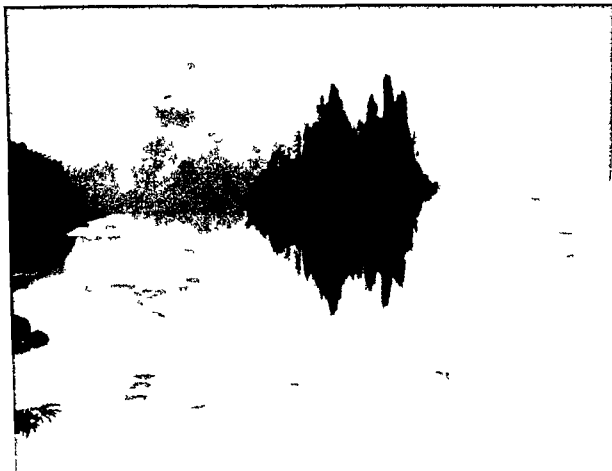


Photo graph by R. H. Cook

PHANTOM SHIP APPEARS SUDDENLY LIKE A FIGMENT OF A DREAM

Cruising around the southern shore of Crater Lake one does not see this craggy island camouflaged against lava cliffs until suddenly the rocks seem to leap from the shore to rest upon the quiet surface of the lake.

more of the early forests of this region.

We also discovered that the layers of lava sloped gently away from the rim—another clue. Surely we said this indicates that the vent of an ancient volcano the volcano that belched forth this lava once existed above the present lake. Here was tinder to fire the imagination.

Diller's mystic mountain Mazama had then really existed. What had happened to this mountain? Where had it gone? What was its appearance in the days when those charred bits of wood were living tissue in mighty tree trunks? How did it look when glaciers moved down its slopes?

Gradually, as the evidence accumulated it became possible to reconstruct the story of the past. Each piece of evidence served as a magic clue to a marvelous story of earth history. This epic is illustrated in a series of paintings by Eugene Kingman. With

this aid it has been possible to go beyond the realms of photography and reproduce the ancient landscapes interpreted from the geologic records.

In the first painting of the series Mount Mazama is pictured as a youthful active volcano (Plate I upper). Frequent eruptions caused layer after layer of lava to pour out on its slopes.

During this period most of the volcanoes of the Cascade Range were active and building up their cones. Lava flows spread over the regions to the north and east forming extensive plateaus. Forces deep within the earth prepared tremendous amounts of molten rock with which to mold the landscape of our Pacific Northwest.

In time Mount Mazama rose high enough to force moisture-laden westerly winds to rise, chill, and give up the water they had gathered over the Pacific. Heavy rains

and snows fell upon the mountain slopes. While the volcano remained inactive, snows persisted throughout winter and summer.

A visitor to the mountain in that day would have had as few reminders that he was climbing a volcano as he might experience today in ascending Mount Hood or Mount Rainier. The young volcano was then the abode of living glaciers which were to leave their imprint on the rocks of the region (Plate I lower).

A MONARCH OF THE CASCADE RANGE

Some may ask: Why is Mazama pictured as a high mountain? The glacial story supplies the answer. By careful observations geologists have estimated that glaciers did not form in this part of North America much below 8 000 feet. If this be true Mount Mazama should have attained at least that height before its first glaciers formed. At its final stage climax of a long period of volcano building the mountain probably reached an elevation of at least 10 000 feet (Plate II upper).

When at last lavas ceased to flow from the crater of Mount Mazama ice and snow again enveloped the mountain. The increased height of the volcano caused heavier snowfall and glaciers larger than those of the earlier period spread far down the mountain side to points five miles from the present rim. The broad valleys sculptured by the ice remain to the present day as reminders of the final stage in the glacial history of the mountain (Plate II lower).

In placing a small cone on the western slope of Mount Mazama in the third and fourth paintings the artist was guided by an interesting record visible on the rocks of the present rim. This consists of glacial scratches so oriented as to prove that ice must have radiated from two separate cones the larger over the center of the present lake the smaller approximately two miles to the west.

The smaller cone called Little Mazama was directly over the site of Wizard Island a volcanic cone of more recent origin which now rises above the surface of the lake. The relative position of Little Mazama and the present island is certainly no mere coincidence. Renewed eruptions from the vent which earlier supplied the material for the secondary cone in later times undoubtedly built Wizard Island.

In the centuries which followed its final glacial stage Mount Mazama underwent a profound change. The whole top of the

mountain disappeared. Approximately 13 cubic miles of material were removed. Could an explosion have caused this great destruction or did the volcano collapse and swallow its head?

In seeking an answer to this important question we turn to Alaska where a terrific explosion in the early summer of 1912 destroyed Mount Katmai.* Here the remains of the former volcano are scattered over the surrounding country. If this history occurred at Crater Lake we should find fragmental material near the present depression. The absence of such debris throws doubt on the grand explosion theory.

It may be that Mount Mazama like Kilauea in Hawaii had a broad crater which gradually enlarged through a caving in process to form the present deep depression. Possibly a combination of explosion and collapse produced the caldera. Although several theories have been proposed the disappearance of Mount Mazama is still shrouded in mystery.

The early history of Mount Mazama suggests that possibly Mount Rainier, Mount Hood, Mount Shasta and other volcanoes of the Cascade Range are in the midst of similar careers. Suppose Mount Rainier today a dormant mountain should eventually resume eruption and destroy the glaciers which now radiate from its peak, possibly this has already happened several times in the early growth of the mountain. If the summit of that volcano should suddenly disappear leaving a giant caldera in the base of the mountain a landscape history similar to that of Mount Mazama might be revealed.

From the summit of Union Peak a few miles southwest of the crater rim it is possible to reconstruct in imagination the mighty mountain of Mazama which for many centuries dominated the landscape. In spite of the many changes during the disappearance of the volcano the broad ice-formed valleys may be easily recognized where they notch the rim of the caldera (Plate III upper).

* See Valley of Ten Thousand Smokes National Geographic Society's Explorations in the Katmai District of Alaska. Valley of Ten Thousand Smokes. An Account of the Discovery and Exploration of the Most Wonderful Volcanic Region in the World. "Ten Thousand Smokes Now a National Monument and Our Greatest National Monument" by Robert F. Griggs in THE NATIONAL GEOGRAPHIC MAGAZINE for January 1917 February 1918 April 1919 and September 1921 respectively.

CRATER LAKE AND YOSEMITE THROUGH THE AGES



A MIGHTY VOLCANO ONCE SEETHED WITH FIRE WHERE MYSTERIOUS CRATER LAKE GLISTENS TODAY

Many thousands of years ago molten rock from deep within the earth poured forth to build in the Cascade Range of southern Oregon lusty Mount Mazama which the artist has re-created from geologic records. Its frequent explosions buried the surrounding landscape beneath pumice and ash to be turned by the alchemy of millenniums into soil of remarkable fertility.



© National Geographic Society

Paintings by Eugene Kingman

GLACIERS WERE BORN ON THE SLOPES OF THE VOLCANO

Continued outpourings of lava raised the mountain to at least 10 000 feet. Snows fell massive layers of ice formed during periods when the subterranean fires were banked. But the record of these glacial caps is now buried under a thousand feet of rock later poured in molten state from the crater.



FIRE BREATHING MAZAMA CREW TO MAGNIFICENT STATURE

Slow but persistent volcano building gradually lifted the mountain higher and higher. A secondary cone developed on its western slope. Whenever the giant was dormant, glaciers cooled its head and forests mantled its slopes, only to be destroyed at the next eruption.



© National Geographic Society

Paintings by Eugene A. Newman

THE VOLCANO SMOLDERS BENEATH ITS ICY COVER

When the lava cooled, vast rivers of ice formed on top and moved in restless majesty down the slopes. Broad valleys that remain today are verdure-clad reminders of the last glacial stage in the history of Mount Mazama.



ALL THAT NOW REMAINS OF THE MAJESTIC MOUNTAIN

Relentless forces leveled the towering peak. The top of Mount Mazama disappeared by explosion or gradual sinking leaving a giant caldera six miles across and four thousand feet deep. Rains and snows have filled this huge depression with the waters of Crater Lake.



© National Geographic Society

Painted by Eugene Kingman

INCREDIBLY BLUE CRATER LAKE SPARKLES IN ITS ROCKY SETTING

Sheer walls rise in some places 2,000 feet above the water. Graceful hemlocks clinging to the rim soften its sharpness with feathery foliage. Clouds that drift above the water send shadows racing across the mirrorlike surface.



© National Geographic Society

Painting by Eugene H. ngman

WIND AND LIGHT ARE FOREVER ALTERING THE COLOR OF CRATER LAKE

Like rival artists seeking an impossible shade, they change the palettes with whimsical suddenness. One moment the gold of the sun may lie unbroken on the still water; the next a fresh breeze erases it and leaves a patch of dancing blue ripples. The small rocky island close to the shore is Hawthorn Island.



THE ARTIST ILLUSTRATES THE FIRST CHAPTER IN THE TEN MILLION YEAR OLD
ROCK STORY OF YOSEMITE

Originally the Sierra Nevada were low mountains and the Merced River wound sluggishly through a wide valley flanked by rolling hills. The ancestor of Half Dome in center of the horizon rose only 1500 feet above the stream and none of the picturesque features that now attract thousands of visitors to Yosemite Park had come into existence.



National Geographic Society

Painted by Eugene H. Newman

SEVERAL MILLION YEARS LATER THE ENTIRE REGION WAS RAISED AND TILTED. In response to this increased elevation the Merced River cut a broad V-shaped valley below its former plain. Such landmarks as El Capitan and Half Dome then became prominent features.



THE FINAL UPLIFT CAUSED THE MERCED TO CUT STILL DEEPER

Thus more than a million years ago just before the Great Ice Age was produced the canyon shown in this painting. The higher peaks of the Sierra Nevada became snow-capped and the lower slopes covered with dense stands of evergreens.

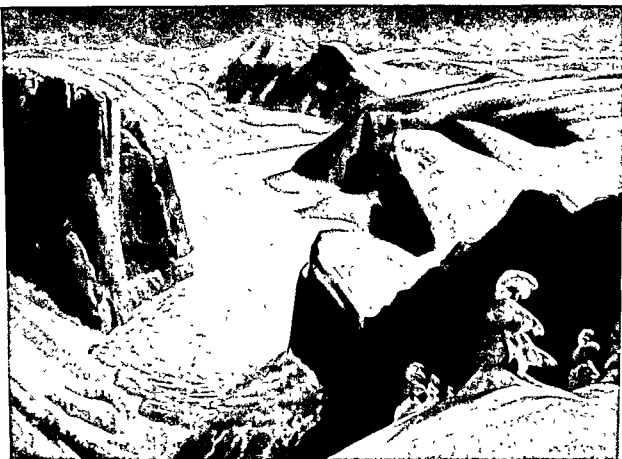


© National Geographic Society

Illustrations by Eugene K. Ngman

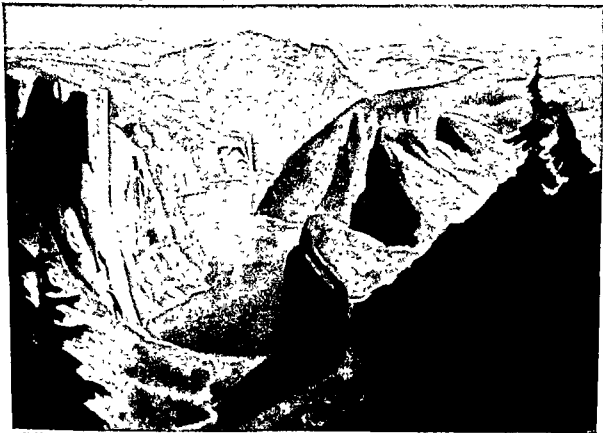
THEN A FROZEN SEA HID THE MERCED RIVER AND YOSEMITE VALLEY

Cold, snowy winters and cool summers favored accumulation of snow and ice in the high mountain valleys. Glaciers formed and gradually pushed into Yosemite, burying the canyon. Half Dome, Sentinel Dome, and El Capitan rose only slightly above the frigid mantle.



THE YOSEMITE GLACIERS MADE A LAST ADVANCE

When the frozen sea (Plate VI) had melted away, a smooth-walled U-shaped valley remained. Many centuries later ice came again, further deepened the valley, and polished the steep cliffs. Half Dome and El Capitan stood up boldly.



© National Geographic Society

Paintings by Eugene Kingman

LAKE YOSEMITE REFLECTED THE GRANDEUR OF ITS WALLS

The debris left by the glacier impounded a large lake which remained for several centuries to grace the valley. But silt gradually filled the shallow basin and produced a broad lowland, now the site of National Park headquarters and of hundreds of tents and cabins that visitors enjoy.



© National Geographic Society

Photograph by Major Albert W. Stevens

THE COLOR CAMERA CONQUERS THE STRATOSPHERE

TO its string of "firsts" the National Geographic Society now adds the first and only natural color photograph to be taken in the stratosphere.

In the past The Society's widely traveled photographers made the first natural color photographs in the Arctic taken by Jacob Gayer and Maynard Owen Williams and reproduced in THE GEOGRAPHIC March, 1926, the first autochromes undersea by Charles Martin, in January 1927, and the first aerial color pictures, by Melville Bell Grosvenor, in September, 1930.

On November 11, 1935, at an altitude of approximately 8 miles above sea level, Major Albert W. Stevens pointed his National Graflex camera straight up through the glass porthole in the top of the gondola and made this Duifaycolor film of the balloon *Explorer II*. Here the great bag looms pinkish in the bright sun, not fully extended to its spherical shape. The bag hides the heavens directly overhead and only patches of sky, 51 degrees from the vertical, may be seen in the picture.

To the balloonists the sky appeared normal

blue at the horizon, but higher it became steadily darker and darker.

Dangling from the balloon (lower center) are the appendages, fabric tubes through which gas can escape when the bag becomes fully extended. The radiating lines—from one of them the American flag flies—are heavy canvas tapes by which the gondola was suspended from the balloon.

The National Geographic Society has just published a series of Technical Papers giving a detailed report of the scientific findings of this National Geographic Society U. S. Army Air Corps Stratosphere Flight over South Dakota when the world's altitude record of 72,395 feet above the sea was reached. The 278 page volume contains 32 papers recording the flight's scientific results and describes the equipment, instruments, and all the apparatus carried by *Explorer II*.

Illustrated with 211 photographs and diagrams, this book contains in addition a photographic supplement 17 by 24 inches showing the lateral curvature of the earth. Copies may be purchased by members from The Society's headquarters Washington D. C., for \$1.50 a copy, postpaid.

Far away in the Alaska Peninsula two volcanoes await careful study by the geologist. One of these, Aniakchak,* has a caldera nearly seven miles in diameter on the floor of which is a small cone closely resembling Wizard Island. Veniaminof has a crater rim more than 6 miles in diameter. Within its huge depression lies a large ice field whence tongues of ice radiate outward and across the rim.

The similarity between these Alaskan volcanoes and Mount Mazama commands the attention of the scientist. Did these mountains pass through the same sequence of events as that recorded at Crater Lake? Were they once higher than they are today?

When Mount Mazama's stormy history ended a lake formed in the bottom of the caldera. Today this body of water maintains a relatively constant level although no streams enter or leave the depression (Plates III lower and IV).

All visitors marvel at the lake's vivid blue color. Some believe that minerals in the water account for this, but analysis indicates that the water is remarkably pure. Some believe the blue is the sky's reflection, but the water is blue rain or shine. Others think the color may be due to a diffusion of light and intensification of the blue portion of the color spectrum. As yet the blue of Crater Lake, like the disappearance of Mount Mazama, remains a mystery.

YOSEMITE HAS A DIFFERENT STORY

Many miles to the south of Crater Lake in the high country of the Sierra Nevada, California, a very different story of earth history has been recorded. Instead of a mighty volcano built up by repeated outbursts of molten rock, we see the valley of Yosemite carved by streams and glaciers.

Today this land is one of our national parks. Each year more than half a million visitors revel in its glory. Many come to enjoy the scenery of the valley; some seek its gracious climate; and others find enjoyment in understanding its geologic past.

I entered Yosemite by the John Muir Trail after traveling several weeks by pack train in the high mountain country south of the park. My first glimpse of the canyon was from one of the high granite cliffs east of Half Dome. As I looked at this majestic form I had a desire to scale its steep walls

and see more of the huge canyon cut so deeply into solid granite (page 330).

Seated on the brink of a cliff overlooking the valley, I attempted to unravel Nature's handiwork, which I knew was recorded in the landscape. I saw waterfalls leaping from valleys which seemed to end in mid-air. I could see the tiny Merced River more than 3,000 feet below me (page 326). Could this stream have cut the canyon which lay before me?

I recalled the story told by François E. Matthes, eminent scientist of the United States Geological Survey, of a great ice age when Yosemite Valley was filled with a giant glacier which moved slowly toward the lowlands to the west. Was it then the work of this ice which produced Yosemite? No not entirely, for streams had played their part long before the ice came.

Most visitors to the park enter from the west, passing between El Capitan and Cathedral Rocks (page 329). These granite forms tower 3,000 and 2,600 feet respectively above the valley bottom. Once through this gateway, the visitor finds himself in a magnificent canyon cut in the granite rocks of the Sierra. At his left are Yosemite Falls, ribbons of white descending the sheer granite cliffs.

After a brief visit to Mirror Lake, where Half Dome casts its reflection in the quiet waters, he proceeds to Inspiration Point, high on the side of the canyon at the other end of the valley. Across the valley are the snow-capped peaks of the Sierra.

Yosemite seems no longer the isolated canyon held in by giant walls, but instead a part of a glorious landscape, an interesting bit of the grand Sierra Nevada panorama. The mighty El Capitan, which rose so abruptly from the valley floor, blends into the upland country, as if it belonged to the mountain landscape rather than to the valley. Half Dome appears as a low mountain rising above the gently rolling upland.

I overheard one visitor say as he stood at Inspiration Point: "It looks as if Yosemite Valley was cut right out of a mountain."

He probably did not realize how truly he had spoken.

Frequently I have heard the question: "Where is the other half of Half Dome?"

For many years the origin of Yosemite Valley remained unknown even to the geologists who visited the region. All attempts to shape its history were incomplete and based upon meager information. It was

* See *World Inside a Mountain*, by Bernard R. Hubbard in *THE NATIONAL GEOGRAPHIC MAGAZINE*, September 1931.



Photograph by Ralph Hopewell Anderson

HOW HAVE THE MIGHTY FALLEN!

Far from the wild state when it foraged for food the black bear has become a beggar posing in the hope of getting a taste of sweets and raiding garbage cans. In Yosemite National Park visitors are cautioned not to feed these animals. A bear is quick and strong and even a scratch from its sharp claws is serious.

Mr. Matthes who finally solved the mystery. He visited every valley and mountain fastness. He examined every bit of ground in his search for the pages of Yosemite's history.

On the uplands above the present valley he found remnants of earlier valleys once occupied by ancestral streams. On the granite walls that rise almost vertically from the valley floor he detected scratches produced by glacier ice. All around him were the tools of mighty glaciers which once filled the valleys of the Yosemite region. High on the mountains were the broad valleys down which the ice had moved.

Let us close our eyes on the landscape of today and go back to a time ten million years ago.

The ancestor of the Merced River meandered through a broad valley in a region of low hills (Plate V, upper). Instead of the present invigorating climate, an enervating subtropical type with high temperatures and heavy rainfall prevailed. The entire area was densely covered with rain-loving vegetation. Evergreens had probably not yet developed in that early period of Yosemite's history.

In response to an uplift of the entire region, the Merced received a new lease on life and the climate became cooler. Instead of the sub-tropical growth of the earlier period a forest of hardwoods and evergreens including the first sequoias, covered

the landscape (Plate V, lower).

Several million years later the Sierra Nevada attained approximately its present height and the Merced River cut a deep canon in the granite rocks of the range. The lower slopes were covered with dense stands of evergreens. Tall sequoias graced the forest landscape (Plate VI, upper).

The narrow, rugged canyon of the Merced was to undergo still further transformation. High in the mountains to the east heavy snows fell during the winter months so deep that the summer sun could not melt them. Continued snowfall produced glaciers, one of which completely filled the valley of the Merced (Plate VI, lower).

This icy mantle which enwrapped the Yosemite region for several thousand years

accomplished remarkable results. It obliterated the sharp turns of the Merced River. The jagged edges of the narrow canyon were worn off.

Scouring its path the rock-shod ice carved the steep northern face of Half Dome (page 330), and created hanging valleys from which today beautiful water falls pour forth and leap into the master stream far below.

Twice again glaciers visited Yosemite Valley. During the last stage the terminal margin of the ice lay just west of El Capitan (Plate VII upper). The valley was deepened and the steep walls were resmoothed and repolished.

The vegetation at this time approximately 20

000 years ago consisted in the main of types now growing there. Pine fir and the giant sequoia flourished.

With the disappearance of the last Yosemite glacier a beautiful lake came into existence. Had the ice left a higher barrier this ancient Lake Yosemite might have remained to grace the valley today (Plate VII lower).

THUS NATURE FASHIONED A SCENE OF IMPRESSIVE GRANDEUR

No major change has since affected the landscape. A scene of impressive grandeur awaits the visitor.

Early belief that Yosemite Valley was the result of some catastrophic dislocation of the earth's crust is no longer accepted.



Photograph from M. Hall McAllister

EVEN WITH HANDRAILS IT'S A HARD CLIMB

To reach the top of Half Dome 8852 feet hikers in rubber-soled shoes to climb a trail of zigzag steps cut in the smooth granite then pull themselves up the last 300 yards by cables strung on firmly anchored posts. If the scaling equipment were not removed each autumn it would be swept away by snow avalanches.

Instead Yosemite's long record when rightly read shows that changes in elevation and the slow but persistent work of running water and moving ice have wrought the marvel.

A visit to Yosemite National Park compels at least an hour of meditation and reverence at Inspiration Point. Here the artist set his easel and translated to canvas the geologic story of Yosemite.

From this point of vantage it is not hard for the imaginative visitor to transcend the barrier of time and to slip eons back into geologic history.

By so doing he may visualize the landscapes of Yosemite's past and comprehend the wonders of earth history that Nature has recorded.

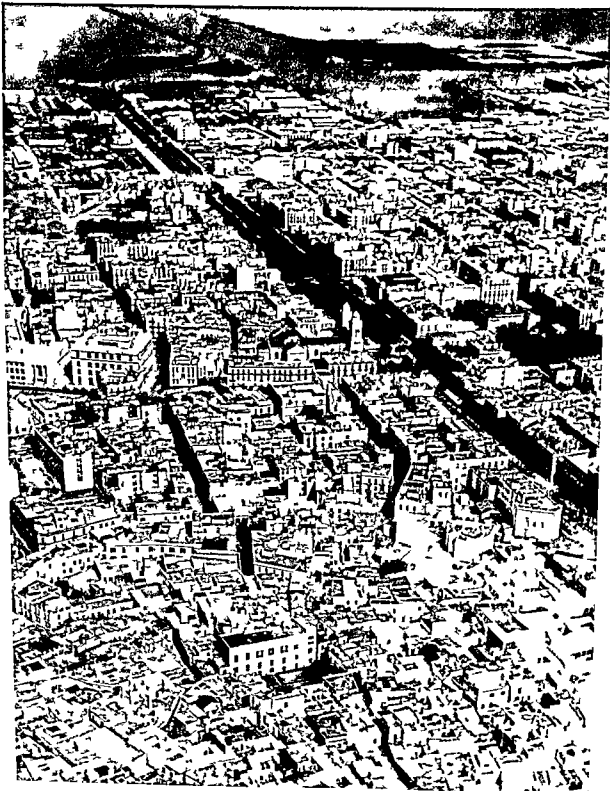


Photo graphed on A. Perrin

IN TUNIS THE WHITE SKYSCRAPERS OVERLOOK AN ARABIAN NIGHTS PANORAMA

The old native quarter (below) joins the modern European city along a curving street. Ruled since 1703 by a long line of Beys, Tunisia became a French Protectorate in 1881 with a Resident General whose official home with its green garden faces the two-towered Cathedral (right center). Main boulevard of the new city is the tree-filled Avenue Jules-Ferry. At its upper end is the shallow Lake of Tunis across which a ship canal runs to the sea about six miles away. A streetcar line to Carthage parallels the coast. Steamers lie at docks to the right of the domed Customhouse.

TIME'S FOOTPRINTS IN TUNISIAN SANDS

By MAYNARD OWEN WILLIAMS

With Illustrations from Photographs by the Author

TUNISIA, its fertile vineyards and olive groves clustered between the Sahara and the sea, is an African suburb of Europe. Lying across a strait from Sicily, it almost divides the Mediterranean into two great lakes.

Overnight steamers run from Trapani, Sicily, to Tunisia's capital, which has more Italian residents than all Libya (map, page 349).

No mere group of palm draped oases is this warm, sunny land. Its wine and oil challenge the growers of France, Italy, and Spain. Another Punic war, this time economic, is on.

After an absence of 13 years I returned to Tunis, which brings the Oriental life, the Moslem veil, shady souks, and peaceful mosques within honeymoon distance of European capitals.

But Tunis, no mere curiosity shop, lives in the present. At the corner of the Avenue Jules Ferry and the Avenue de Carthage—tree-shaded Times Square of the Tunisian metropolis—part of the city's 46,000 Italians watched red, white, and green flaglets mass closer on a map of Ethiopia. Representatives of the 33,000 Frenchmen of Tunis saw, behind bulletin board news flashes, German feet goose-stepping back into the Rhineland.

Down in southern Tunisia, motor trucks were rushing oil and grain to Ben Gardane, whence silent footed camels, forgetful of sanctions, carried provisions across the Libyan frontier toward Tripoli (map, page 350).

THE CATHEDRAL AND THE MOSQUE

Neither the Casino, nor the electric cars to Carthage, the Viennese lady orchestra in a cafe, nor the animated promenade along the tree-lined avenue held me for long. I wanted to munge again with the lean and slippered Moslem Berber, Bedouin, and Zlass.

Strolling through the Porte de France at Tunis, from the European quarter of hats and shoes into the native precincts of fezzes and slippers, I entered another world. Outside is the Cathedral; inside is the Mosque. Outside tables of machine-made merchandise, soliciting trade on the sidewalks,

inside, tiny shops which entice possible patrons of handicrafts with the insidious hospitality of the coffee cup.

A Christian statue dominates the Place Cardinal Lavergne where the Moslem dominates the life of Frenchman and Italian, Maltese, Berber, and Jew. Yet, in this land of Cross and Crescent, Christians bled for their faith centuries before Islam passed here on its march toward Spain.

In the heart of the souks, where concentrated perfumes and hand carved candles, bright slippers and brighter silks, mellow carpets and lustrous copperware hide the nakedness of mere holes in the wall, I sought out a little square with red and green columns, falling arches, and an optimistic array of coffee tables—the slave market.

For every beautiful slave, her blond hair spread wide on brown fingers whose real delight was in firmer gold, there were hordes of pitiful creatures, so shrouded in misery that it is a wonder they could be sold.

In the former slave market of Tunis, I watched American visitors buying jewelry.

TRIPOLI—AND THE U. S. MARINES

The United States was the first Christian nation to win immunity from the depredations of Barbary corsairs. The *Phœnix* ran aground on the Tripolitan coast, and William Eaton made his spectacular march of 600 miles across the Libyan Desert, trying to re-establish a friendly Bey in Tripoli.

Tripoli's name formerly appeared in the legend on the colors of the United States Marines,* and still is familiar in the song, "From the Halls of Montezuma to the Shores of Tripoli."

"Old Ironsides" also played a part in curbing the Barbary corsairs.

"HOME, SWEET HOME"

Another point of pilgrimage is the burial place of John Howard Payne. Three of us rode by in a carriage drawn by two willing little horses scarcely bigger than St. Bernards.

* See "Flags of the World" by Gilbert Grosvenor and William J. Showalter. NATIONAL GEOGRAPHIC MAGAZINE, September, 1934.



THROUGH STORM CLOUDS, SUNSHINE SPOTLIGHTS THE MOSQUE OF SIDI MAHREZ

Below, as twilight darkens the Place Bab Soufka, cafes are crowded with Moslems who sip coffee over games of dominoes, while bread vendors cry their wares in the street. Not far away is the place where John Howard Payne, American consul at Tunis and author of *Home Sweet Home*, was buried in 1852 before his body was transferred to Oak Hill Cemetery in Washington, D. C.

Home, Sweet Home doesn't stand translation, for the French don't write songs about their homes. They stay there.

Payne's body at last came home. On the simple monument in the cemetery of the little English church at Tunis are these words:

In the tomb beneath this stone, the poet's remains lay buried for thirty years. On January 5, 1883, they were disinterred and taken away to his native land where they received honored and final burial in the city of Washington, June 9, 1883.

We went on to sun-slashed souk and shadowy shop. Here a bearded Moslem gazes at a chromo of a fair-skinned girl. There a veiled woman fingers a sequined gown, draped from a hanger shaped like the head and shoulders of a bobbed-haired blonde.

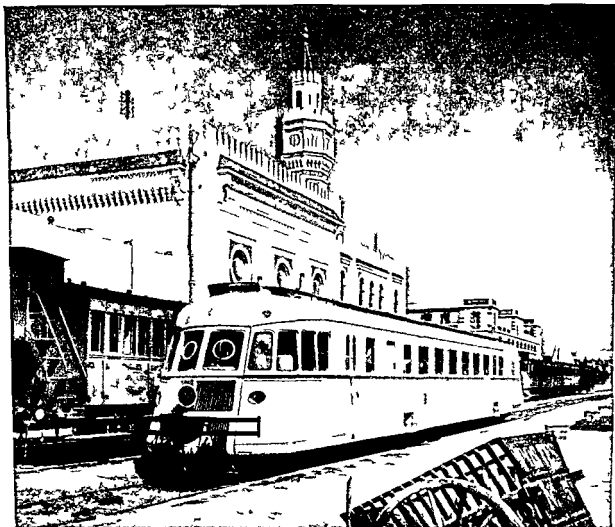
Machine-made silks hang side by side with a tapestry, hand woven by some Zass tribeswoman generations ago, and passed down from mother to daughter until hunger turned an heirloom into a curio.

THE RADIO AND PHONOGRAPH ARRIVE IN THE CITY OF DOMES

Cafe habitués, formerly entertained by lively licks and shrill voices, now solemnly listen to the metallic falsettos of a loud speaker like a flytrap, or a 'phono' horn shaped like a morning glory.

Above the screeching of orange-sellers, Klaxons, and streetcar wheels in the Place Bab Soufka, camellia white domes rise like bubbles.

Through a mere alley cluttered by the barrows of vegetable merchants and baskets of those who sell spinach, ground henna, or



A STREAMLINED SHIP OF THE DESERT PULLS UP AT BIZERTE'S STATION

Diesel driven cars called Michelmes run from Tunis to this ancient Phoenician seaport now a French naval station and garrison town. On the next track stands an old fashioned third class carriage with steps leading to the brakeman's lookout post.

red pimiento dust. I returned to the Place Halfaouine. There, during Ramadan Moslems fast and sleep by day and gorge themselves by night glimpsing naughty puppet shows or playing dominoes.

A JUMBLE OF ART TREASURES

Such pleasures palling I rode out to the Bardo Museum, once the secluded women's quarters of the palace of the Beys (355).

Where the Beys' womenfolk lived like birds in a gilded cage, visitors marvel at the unique treasures of this collection of Punic, Roman, Christian and Arab art.

This priceless hoard of historic loot would disconcert a modern archeologist for scant records were made of the exact places and conditions where the relics of long gone centuries were brought to light. But there they are in breath taking quantity and excellence.

Crops and thistles now grow on sites whence these ancient stones came and companion pieces of these matchless mosaics, here polished and protected now crumble under careless feet at Dougga (page 381), Thuburbo Majus, Bulla Regia and Sbeitla.

Petrified footprints made by Rome's seven league boots in Tunisian sands have here been marshaled in a setting of rare charm. Surely not even the chosen ladies of the Bey ever graced these halls as do the gods and goddesses in marble and bronze.

Thirty years ago a sponge diver off Mahdia came gasping to the surface, his eyes dilated with fear. In the shadowy depths he had suddenly met face to face with a mysterious monster. His sceptical comrades forewarned dove down. Ignorant though they were they came up swearing secrecy. For the monster was part of



Photograph by Branson De Cou

MEN MASK, VEILED WOMEN SHOW THEIR EYES

In the bright sun Tunis, a men wear dark glasses. At twilight, white gowned women seem to lack faces entirely because of their black masks. The red tarboosh worn by the passenger right is less common here than the motorman's soft round skullcap with its long silk tassel on the far side.



A BYRBER VERSION OF MARY HAD A LITTLE LAMB

The woolly pet sticks to its mistress in Gabes as faithfully as the lamb in the nursery rhyme. Twilight drives through the oasis in antique victorias drawn by bonv nags; put visitors in the proper mood to appreciate waving palms against the sunset sky.



TUNISIA, AFRICA'S NORTHERNMOST TIP, NEARLY DIVIDES THE MEDITERRANEAN INTO TWO GREAT LAKES

At Cape Bon the continent is only 90 miles from Sicily. Thus strategically located Tunisia might become a potent factor in a war in the Mediterranean. This former Moslem domain is now one of France's vast North African possessions which include Algeria and French Morocco. Opposite Gibraltar is Spanish Morocco where the revolt against the Madrid Government began.

the ancient booty which Sulla shipped home from the sack of Athens. Wrecked off Mahdia this hand-picked art collection never reached pre-Christian Rome.

LOVE AMONG SEA-SCARRED RUINS

One bronze figure at Le Bardo is a replica of Praxiteles' Eros and this love is truly blind for the eye pits lack pupils (page 351). The original, known and described by Callistratus, is lost. And this glorious figure rescued from the sea twenty centuries after its shipwreck dominates a series of halls in which Sulla's shipload of loot is now displayed.

Sharp sand proved kinder to the Pentelic marble than the surging sea. A smooth hip which rested for 2,000 years on a bed of sand still has a glasslike polish. But where the water like an acid pitted the smooth skin no semblance of the original lines remains. The chaste curve from shoulder to breast over which some Greek sculptor labored with love gave way to pock-marked decomposition.

The bronzes suffered less. Dancing

dwarfs still are grotesquely amusing and a virile figure with stormy hair reaches out to grapple an adversary with the lifelikeness of a slow motion movie.

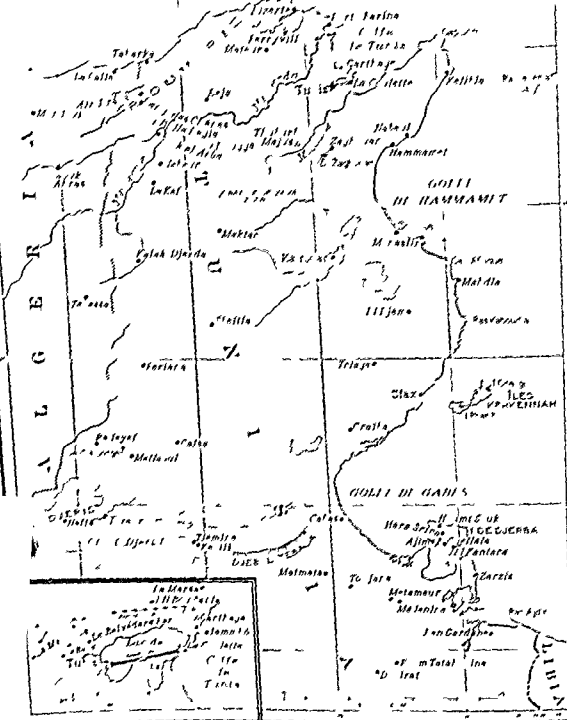
In what was the Bevis banquet hall a colossal head of Jupiter itself as tall as a woman looks down on Neptune's cortege pictured in a mosaic large as a tennis court.

A mosaic showing the Cyclops working under the direction of Vulcan makes Polyphemus seem like a modern pictured on a poster twice life size.

Le Bardo's Arab treasures occupy a little palace surrounding a patio which gives the proper note to Moslem tiles, tooled leather, carved plaster and damascened swords. But to bring Arabic art to life one leaves the museums and climbs the hill in Belvedere Park and there sitting in a dream of structure watches the play of sunlight and cloudscape on Tunis the White.

TO CARTHAGE BY ELECTRIC TRAIN

One goes to Carthage by automobile or electric train. Shades of Dido, Hannibal and Hamilcar!

[illegible]

MR. STEPHEN STEWART'S KATHAKA AND THE KPA TULUMIA IS LARGER THAN I PA' JRYIVA'S IS

[illegible]

But for Virgil * and Gustave Flaubert, Carthage would be deadlier than ancient Philadelphia, which now is Amman, Trans-Jordan.

Just above the station, in a little garden massed with daisies and geraniums, is a monument to Flaubert. The head, representing the 'immortal author of *Salammô*' (his "*Madame Bovary*" isn't even mentioned in Carthage) is less than life size. But Flaubert's romantic description clothes the city site with an aura of lasting glory.

When I first visited Carthage, in 1923, I wondered how Flaubert, without the advantage of Père Delattre's lifetime of excavations, had brought that historic countryside to life.†

Today, it seems a blessing that the author wrote some 75 years ago, for Carthage is less Carthage now. Stucco villas are crowding closer and closer about the ancient ports and their gardens climb higher and higher on the Byrsa, where the Carthaginians had

their fort and temple and around which 700,000 of them had their homes (354).

The site which Dido chose is too blessed by beauty and climate to remain a mere sepulcher for a vanished race which left its most notable monuments on the maps of

* See "The Perennial Geographer," by W. Coleman Nevils in THE NATIONAL GEOGRAPHIC MAGAZINE, October 1930.

† See "Ancient Carthage in the Light of Modern Excavation," in THE NATIONAL GEOGRAPHIC MAGAZINE, April, 1914.



Photograph from Lehnert

"BLIND LOVE," SHIPWRECKED 2,000 YEARS AGO, STILL SURVIVES

This copy of Praxiteles' statue of Eros, with other art treasures now in the museum at Le Bardo, is supposed to be part of the loot which Sulla, Roman dictator, sent home after he sacked Athens in 86 B.C. The vessel carrying the booty sank en route to Rome, and the bronze God of Love reposed in Davy Jones's locker until a surprised sponge diver discovered the wreck 30 years ago at Mahdia (page 347).

primitive seamanship and ancient world commerce.

Carthage isn't Carthage, and possibly never was. What remains is Punic, Roman, Christian, Moslem, and *art moderne*. Here heavy-footed elephants shuffled down long ramps to their stables and armed men stood watch on walls that seemed impregnable. But the site is a grab bag of history, and unless one is careful he stumbles over anachronisms.

The guardian spirit of Carthage is a novelist's creation, whose name has been appropriated by a seaside suburb. As one rides from La Goulette (the gullet of the Lake of Tunis) toward Carthage, the streetcar conductor shouts *Salamambo*. Strangers start at the magic word.

The only Punic relic worthy of Flaubert's heroine is a young priestess with a dove in her hand and her soft robe ending in wings which cross over her limbs. Among the stone ammunition, crude steles and cinerary caskets of the Punic period, this life-size coffin top stands out like a pretty girl in a morgue.

Revengeful ancients who vowed not to leave one stone of Carthage on another kept their promise, but this lone figure slept on in her hillside tomb and so survived to prove that the Punic traders who took their art where they found it, were not entirely lacking in taste.

ANCIENT CARTHAGE PORTS AGAIN LINKED TO GULF OF TUNIS

The ancient ports of Carthage, long isolated from the sea by the building of a shore road, are again connected with the Gulf of Tunis. In the interests of health small channels have been dug. The naval and commercial harbors are now connected with the Mediterranean whose Levantine shores bathe the piles of murex shells from which Tyre and Sidon extracted a purple whose memory still colors history.

From the rough stones of the amphitheater rises a white cross.

Why this modern emblem in this pagan arena one wonders. Then he remembers Cardinal Lavigerie who never lost his historic sense amid his numerous good works erected this seemingly incongruous cross over a spot where Christian martyrs, to whom that symbol was more than life were put to death some 400 years before Mohammed was born.

Carthage must be destroyed was a grandiose slogan. But Caesar and Augustus had more sense than Scipio. They deliberately restored a ruined enemy to more than its former beauty and Hadrian gave it an aqueduct whose remains still rank among Tunisia's most impressive ancient monuments (page 357).

For miles his high arched aqueduct stretches above grainfields and grazing flocks, coming from Mount Zaghouan which provides Tunis, as it did Carthage

with water. We paralleled it on our way to Kairouan the Saintly.

How describe this holy place created by Moslems some of whom had seen the Prophet in the flesh? Nothing I had read prepared me for the silence of the Great Mosque the polychrome tiles of the mosque of Sidi Sahab, the grotesque swords and giant pipe of the Mosque of Sabers the teeming marketplace of the Rue Saussier, or the relentless irritation of street Arabs begging, 'Good day, mister, give me a cigarette'.

Once a year the word evidently goes around that the little pests shall cease to pester. And since that luxury comes at a time when Kairouan is at its best, a visit on the last day of the annual Rug Fair is pleasantly memorable (page 372).

Soon after dawn to receive powder for their salutes, the famous Zliss horsemen assemble beside the circular pool of the Aghlabites. Clad in their best robes and wearing sombreros whose broad brims are held up by ostrich feathers they seem a docile lot. But when the Resident General's car arrives the tempo quickens.

By afternoon these somnolent horses will be racing at breakneck speed while their riders stand in their saddles sweep the earth with their heads do a shoulder stand on a galloping charger, and juggle gun and saber in mimic warfare (page 358 and 360).

Among the whitewashed graves where the dead huddle as close as possible to the Great Mosque, veiled women stand and cheer.

Ever has not lost her delight in weddings. When the rider sweeps down on a cortege grouped about the silken saddle tent of the bride to be, and an Arab Lochinvar abducts the angel of his dreams from half hearted defenders who are probably glad to have it over with, the veiled women ululate their delight. The fact that the silken canopy is empty doesn't spoil the fun.

OLIVE OIL FOR BEAUTY PARLORS

Between Kairouan and the southern oases stretches the eastern plain, in which the French protectors take just pride for they have restored fertility to a region long barren. In neat rows, miles long and 80 feet apart stand olive trees whose only fault is their fruitfulness.

When Paul Bourde, a journalist convinced of ancient olive production here by the ruins of Roman millstones brought



Photograph by Martin Hufmann

STILL HOLY BUT OPEN TO ALL SINCE 1881 IS KAIROUAN

Until the French occupation entrance to this saintliest city of Moslem Africa was by special permission of the Bey. Today although *Unbelievers cannot enter the mosques of Tunis and lesser Tunisian towns* they can visit the principal temples of Kairouan. To the right of the old city gate where Arabs drink coffee in the sun is a column like those that form an antique forest of pillars in the Hall of Prayer in the Great Mosque Sousse and Carthage and many another ancient town furnished the marble and porphyry of this Holy City.



COMIASED BY AN OX HIDP, TRAMPED ON BY WAR ELEPHANTS THE DIRS OF CARTHAGE NOW BARS THE NAME OF ST LOUIS
 Carthage was traditionally founded about 850 B.C. by Queen Dido, who brought from the Phoenician nation as much land as could be contained by the
 skin of an ox. She cut out the hide into narrow strips which she strung together and built the city upon it. The ruins of the city were discovered in 1695 by the French
 explorer Jean de Vins. The ruins of the city were discovered in 1695 by the French explorer Jean de Vins. The ruins of the city were discovered in 1695 by the French explorer Jean de Vins.



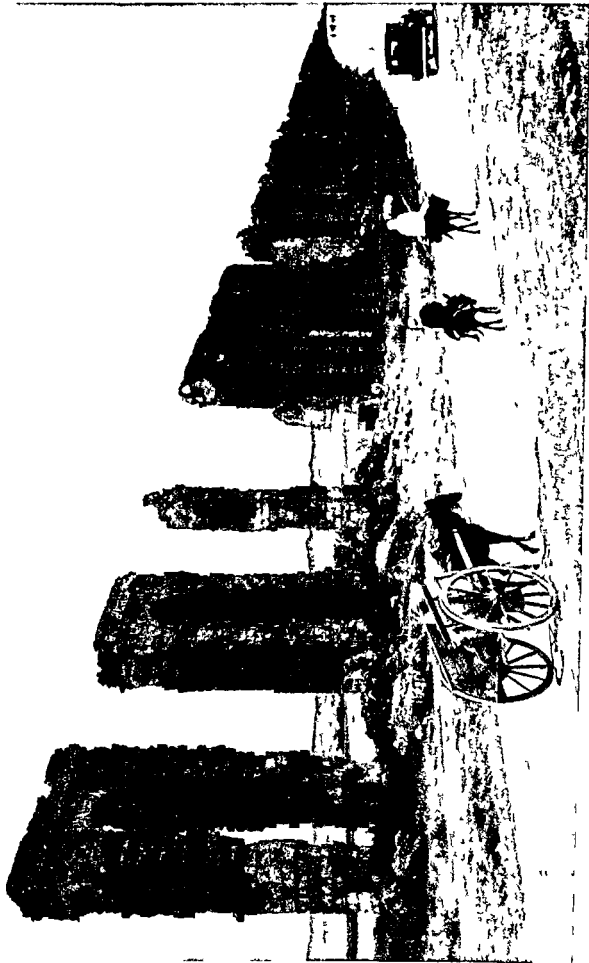
BETWEEN MARBLE LIONS DISTINGUISHED TUNISIANS AND FRENCH OFFICIALS GO UP TO PAY RESPECTS TO THE BEY

Sid Ahmed here (far right) holds audience at Le Bardo during the Moslem celebration of the Lamb Sacrifice related to Abraham's sacrifice of the ram (Genesis 22:1-13). The tricolor of France hangs side by side with Tunis's star and crescent on the pillars of the former women's quarters which now house the Alaoui Museum as well as special apartments for the Bey's receptions (page 347). In the throne room are portraits of native and European sovereigns together with sundials and other objects received as presents.



SONG 3 000 PEOPLE LIVE IN THIS ROCK MURDED VALLEY—BUT ONLY AN AVIATOR CAN SEE THEIR 700 HOMES

Cave dwellers of Matmata dig enormous square holes in the earth. Each serves as the courtyard of a home. Living quarters, storehouse and stable are hollowed out of the live walls (page 159). A ramp leads down to each residence. Surface buildings include small whitewashed mosques (foreground and center) and offices of the French Administration (upper left). Strolling visitors are not welcomed on this lunar landscape for they might catch forbidden glimpses of unveiled women sitting



WITH THIS AQUEDUCT ROME SAVED CONQUERED CARTHAGE FROM DILATII BY THIRST

Restored time and again to carry pure water from Zaghouan to Carthage and Tunis this structure dating from about the time of Hadrian has now been replaced by an underground pipe line which follows approximately the same route. Where 70 foot arches bridged the Valley of the Milirne a hidden siphon now does the trick. Of the 60 miles or more of the original aqueduct only a few miles still stand. The thrilling account of how Spendius and Matho entered Carthage through this conduit is one of the bright spots in Flaubert's novel Salammbô (Chapter IV)



FIRECRACKERS AND FLYING HOOFS RING OUT AS ZARZIS HORSEMEN STAGE A CHARGE

Buffalo Bill brought riders like these to America for his Wild West shows. Racing past crowds of French soldiers, civilians, and robed natives, the tribesmen stand in the saddles, lean from their horses and sweep the earth with their heads. Free double-barreled guns and flourish-glittering saleros. This fantasia is the grand finale to Kairouan's annual Rug Fair in April (pages 360 and 372).

back groves to regions the Arab invader had laid desolate, he failed to bring back the little Roman lamp.

Even beauty parlors can't use as much olive oil as did the Roman athletes who rubbed it on thick and then scraped it off in rivulets with the curved *strigil*. Lands of corn and cotton offer substitutes, and the Philippine palm seeks its share of the oil trade. Bourde succeeded all too well. Tunisian olive oil, the equal of any, begs for buyers at a fourth its former price.

Later my old friend Grauffreteau welcomed me to his charming home, formerly a Turkish bath. And in his entrance hall is a significant curio: an old bronze lamp designed none knows when to burn olive oil.

Someone adapted it to gas, then electric light. Grauffreteau isolated in his oasis at

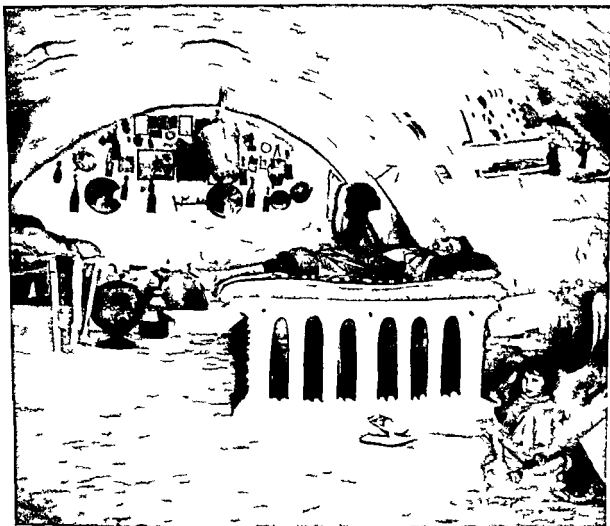
Zarzis and able to get by products of olive oil for nothing, restored this antique lamp to its original job. Its light is as soft and flattering as that of candles.

The museums are full of little terra cotta lamps, some of their decorations are as fine as cameos. Selling for a song and as common in antiquity as matchboxes today, they reflect the life of their time.

SLAX SHIPS SPONGE FOOD

Sousse and Slax are the big cities of Tunisia's eastern plain. Each has its neat European quarters, each its interesting native town.

Sousse then Hadrumetum helped Hannibal fight Scipio; and later was carpeted with Roman mosaics. Le Bardo's little gem found at Sousse shows Virgil writing the *Aeneid* between the Muses.



IT'S EASY TO SWEEP UNDER A TROGLODYTES BED

Built into place a way from drafts and heat this casterless bed of a Matmatan cave dweller is a feature of the underground home. Baskets and cooking utensils are kept at hand but there are other rooms for tools, animals and grain. Even in summer such a bedroom is cool and relatively free from flies or vermin for it fronts on a well like excavation open to the sky. (page 356)

Sfax second only to Tunis ships phosphates and fishes for sponges octopuses and a variety of finny fodder. Its neat European quarter seems like an exposition city. Native life centers in the mosque. On raised benches covered with matting dealers sell frumpy gewgaws and a fortune teller divines from field beans.

Between Sousse and Sfax a Roman ruin dwarfs the modern town for which it was the quarry. It is the Amphitheater of El Djem. One sees it from miles away and its memory follows one for years.

In the eighth century when Kahena Berber queen sought to repel the Arab invaders this coliseum served as her fortress. Except for this and a few other martial interludes the towering structure stood there empty as the Yale Bowl or the Ann Arbor Stadium between games waiting

only for 60,000 spectators to swarm toward the clouds and look down on the barbaric spectacles in the arena.

Then at the end of the 17th century rebels hid here a Bey broke through the wall to reach them and El Djem each of whose stones had been painfully quarried and shaped became a source of ready-made building blocks for puny huts.

Still towering like a noble patriarch above its ignoble offspring this stately ruin dominates the plain.

At Gabes where palm fronds mass between sea and sand a little stream marks the sharp cut boundary line between town and oasis.

All day beside that stream and in it native women with ornate jewelry about their ears pound laundry with paddles made from the spine of palm fronds or wring the



CLASS RIDERS WEAR RICH SILK GOWNS AND 10 GALLON HATS WITH OSTRICH PLUMES
Mounted on spirited desert horses, they are ready for the fantasia (page 158) Moslem women use the minaret of Kairouan's Great Mosque as a grandstand for the show,
ranging themselves in black lines around the high balconies (page 152)



TUNISIAN JARS ARE SHAPED LIKE THE AMPHORA OF OLD

Removing graceful jars from the primitive kiln is Messaoud el Ghul (left), who was sent by his fellow townsmen to study ceramics at Sfax in the suburbs of Tunis. In a land of wine and olive oil such pots are widely used. Our knowledge of the ancients comes from their decorated jars.



CHURNING MOVES TO SWING TIME IN TUNISIA

To make butter from sheep's milk, the nomad girl jerks the suspended goat skin back and forth as vigorously as if it were a cocktail shaker. Drought in southern Tunisia drove this family to the more fertile north. Here they camp beside the Tunis Bizerte road.



CAMELS BRING GRAIN TO BE STORED IN BAMLESS SKYSCRAPERS

Lacking timber and desiring a safe place to hide their goods from bandits, people of Medenine piled these arched windowless chambers one on top of the other. Today flat roofed houses of steel and cement are supplanting the *ghorfas* in this important French Army post near the frontier of Italian Libya (pages 364-367)

necks of writhing bedcovers colored like Joseph's coat.

One look at their bright robes bordering a blue stream under waving palms and I rushed back for my color camera.

But I had only to spread my tall tripod and hide my face in a focusing cloth to make the army of women retreat behind mud walls.

For hours under the burning sun I tramped up and down that little valley. Women and their disrespectful daughters hunched at my floundering on the slippery bank. No one minded how much I looked. But they thought my camera had an evil and unkind eye.

Lugging the hateful machine, I retreated in full defeat from this human rainbow.

At twilight I rode in a carriage under the palms because my heart echoed the declaration of an eager coachman that "an auto isn't the same thing." The palm fronds played badminton with waves of coolness and little children herding round bellied lambs gave smiles without money and without price.

DESERT LIKE A LUNAR LANDSCAPE

The next day we entered the desert—it was like going through a door—rolled south amid barrenness and climbed the Matmata hills. From a stratosphere balloon Mat



GIRLS ON CAMELS HALT BESIDE A HUGE ROMAN AMPHITHEATER

Muzzled the beast at the right is prevented from nipping passers by or stealing grain while on the march. The Amphitheater scene of many a gory drama dates from the days when El Djem's olive groves made it one of the richest Roman cities in Africa (page 359)

Matmata would resemble a lunar landscape. But approach it by car and you wonder where the thousands of troglodytes have their homes (pages 356-359).

In Moslem lands the roofs belong to the womenfolk and in Matmata the whole countryside is a roof. If you stroll too near you look down into the privacy of sunken courtyards circled with living rooms and storehouses.

When the Arab invaders came the Berbers dug in, hiding their wives and treasures in caves.

Although the war has been over for centuries the Matmatans still keep to their trenches. They are not so much cave dwellers as sun evaders. For every summer

brings back an enemy heat as formidable as were the Arab arms.

Even in March it was pleasant to seek shelter from the sun in Matmatan caves. The fields are miles away where folds in the hills retain a bit of moisture, but at night the miserable Matmatans trudge back to their holes in the ground because those holes in the ground are home.

In woven baskets like Ali Baba jars their grain is stored. Their goats run down the cave fronts into subterranean stables. Camels cork up the narrow tunnels as they come down to their holes like ungainly rats. On tiny clay stoves the women cook their food. Firmly built in place their nuptial couches, draped with hand-woven bedcoverings,



THROUGH THIS ARCHED DOOR A MOTOR CONQUEROR OF ASIA
GOES TO BATHE IN THE SEA ODYSSEUS KNEW

Near the olive growing oasis of Zarzis on the eastern coast of Tunisia
Lies Louis Audouin Dubreuil joint leader of the Citroen Haardt Trans
Asiatic Expedition which the author accompanied in 1931-32 (page 369)
Negro servants gossip at the entrance to the garden fronting on the ex-
plorer's private beach

ers are beyond the reach of heat or cold
As for rain—if it would only come

Sitting in a similar shelter in Douirat
whose caves are not in wells but in sky
scraping cliffs the Caid said, We have
nothing to fear

Through the mountains we rolled to Tou-
jane which desert men unaccustomed to
declivities praise for its beauty then
pressed on to Metameur and Medenine

Both Metameur and Medenine are dis-
tinguished by arch roofed *ghorfas* often su-
perimposed and in places reaching to five

stories Only a fly
man would think of
living on the top floor,
for the ladders are
projecting bits of
stone which zigzag
from door to door on
their way up (page
367)

The fibrous trunks
of palm trees do not
make good timber so
the arch and dome
are substitutes Iron
beams and reinforced
cement may finish the
ghorfa These bee
hive shelters are still
used for storing grain
and field tools and in
the lower stories poor
folk glad of any roof
still hang on as do the
cave dwellers of Mat
mata

A camel standing in
front of a ghorfa row
makes one think I
must photograph this
combination now for
it will soon be gone

GAS TANKS ARE MODERN OASES

Airplanes and mo-
torcars now cross the
Sahara from end to
end Water Hole
Such and such has
become Bidon This
and that—a gas tank
instead of a well
(opposite page)

Lotus-land was call-
ing and we crossed
the narrow channel to
Ajim on the island of Djerba which has
spread anticipation and disappointment far
and wide (pages 370 and 373)

THE LURE OF DJERBA

Lotus eating has become rarer than tak-
ing snuff and forgetfulness is the one thing
Djerba lacks Its people emigrate in large
numbers But when their fortune is made
back they come to buy a white-domed
farm house tie a camel in front of its door
for decoration and end their existence
under their own palm and fig tree



HOMI, SWEET HOMI, IN LOTUS LAND

Djebans are great travelers, 'but when their fortune is made, back they come to buy a white-domed farmhouse tie a camel in front of its door for decoration, and end their existence under their own palm and fig tree' Here Odysseus' sailors, forgetting their homeland, had to be shanghaied back to their own ships



WHERE HAMILCAR FED ELEPHANTS THE MODERN TRAVELER BUYS GAS AND OIL

Colored tiles embellish the filling station and the domed rest room (right) which contains a public telephone. In front of the trim garden runs the highway from Tunis to La Marsa, seaside bathing place. The author paid 54 cents a gallon for American gasoline.



BATHITUB AND LAUNDRY THIS STREAM ALSO SUPPLIES DRINKING WATER

A source of water is more potent than governments in establishing an oasis like that of Tozeur. Rome left a footprint in this watercourse when she occupied the land of palms which the Berbers call the Djerid and this antique bar or obstruction in the stream is still called the Roman Barrage. Rain is almost unknown here; the size of the oases is determined by the quantity of spring water available. Each palm grower's allowance for irrigation is carefully measured and woe be to the man who diverts water illegally. (page 373)

At nightfall I went out to the port of Houmt Souk for Djerba is famous for its fisheries and smuggling and all unexpectedly came upon a prosaic little pyramid marking the site of the tower of skulls.

Here's the tale. In the sixteenth century, when Moslems, Sicilians and Spaniards were warring a young brute named Torkud or Dragut rose to such power that Barbarossa gave him a squadron. Dragut dedicating his ships to piracy and the slave trade soon made a name for himself.

His hated enemies the Spaniards had built a fort on Djerba as an advance base against Tripoli. In 1560 under its very walls Dragut and Iiali Tusha dashed in on the anchored armada, burned and sank

the Christian fleet, massacred sailors and garrison and like Timur the Lame erected a pile of skulls which stood there for 300 years.

Less than a hundred years ago a French consul got the Bey's permission to bury the time-bleached relics of Dragut's cruelty, erecting in its gruesome place this prosaic little pyramid.

Christian vengeance overtook Dragut for the Knights of Saint John killed him in open battle at Malta and there his bloodthirsty sword still remains.

DESCENDANTS OF JERUSALEM REFUGEES IN TIME OF TITUS

When Titus captured Jerusalem—which goes still farther back into history, but is



IT TAKES A HUMAN FLY TO REACH THE TOP FLOOR

The only way to get into these four or five story apartment houses in Medenine is to climb up the outside on rude stairways or stones projecting from the adobe walls. The dark, vaulted cells inside are now used mostly for storing grain and tools, but poor folk still occupy the lower floors (page 367). European homes in this military post are built amid palm trees. Sportsmen sometimes journey here to hunt mouflons, wild sheep which are exceedingly wary and difficult to stalk.



A CAMERA-SHY "CAVE MAN"

His home is cut in a high rock cliff overlooking the stony desert. The troglodyte headman of Dourat promised him a present if he would "look at the birdie," but the youngster bashfully sucks his thumb

worth it—a company of Jews escaped into Egypt and ultimately arrived on Djerba. Two communities of them still live there in a purity of blood and traditions which is unequalled in Jerusalem itself. Near Hara Srira is a synagogue, famous throughout Jewry, in which I spent a memorable hour during the weekly worship of the Law.

Only with reverence and the consent of the worshipers do I use a camera in church, mosque, or synagogue. When I entered the Ghriba, I capped my lens.

Imagine my gratitude when a handsome Jew with large sad eyes and a flowing beard made signs that I might take pic-

tures! Making every effort not to disturb the spirit of the service, I moved freely among the congregation.

Before the Holy of Holies I held back, for I did not want to take undue advantage of such tolerant hospitality. But another rabbi urged me on (page 379).

Near the doorway to the inner shrine two men, in a seemingly accidental manner, blocked my path, and when the Scroll of the Law was brought forth before the people I made no effort to photograph it.

Perhaps unusual tolerance exists there because no one knows the race or religion of the woman in whose memory the first Ghriba was erected.

Saved from famine by the Jews, this mys-

terious one lived among them in prayer and meditation. One morning they found her lying dead, but with a look of ineffable peace on her face as with open eyes she gazed up into the Beyond. On that spot "the Marvelous" synagogue was built and thither every year come Jewish pilgrims from far away.

VISITING AN ISLAND POTTERY

Djerba provided me with one more thrill, for I visited the potteries of Guellala under the guidance of Messa'ud el Ghul, who, showing talent, was sent by the Djerbans to Sevres, France. The soft clay shaped



NO CAFETERIA—THIS IS MEDFNEINE!

Crouching on the ground the camel munches grain in a coarse sack into which some of his own hair may be woven. Ugly as he is the camel is a pampered beast. At the end of a day's march Arabs often spread their cloaks as tablecloths for their mounts.

by the hands of this island potter takes the honest form and finish which peasants enjoy and artists copy (page 361)

In the Place de Tunis at Kairouan beside the port at Mahdia and outside the battlements of Sfax the play of light and shadow on piles of unpretentious pottery has unusual appeal. Much of it must have been shaped by the knowing fingers of a Djerban potter who studied at Sevres but kept his head.

The Romans connected Djerba with the mainland by a causeway now a series of steppingstones for telegraph poles. Rome's seven league boots wore out but her high

ways remain. From El Kantara we ferried our motor across in two tightly lashed sail boats toward Zarzis where Audouin Dubreuil away on a motor foray into the Sahara invited me to occupy his beautiful home (page 364)

I missed this old friend whose tent I shared between Beirut and Peiping but fortune favored me for I was greeted by Gauffreteau whose cooking I savored along Marco Polo's trail. I still remember burning my upper lip on one of his stews.

* See *From the Mediterranean to the Yellow Sea by Motor* by Maynard Owen Williams NATIONAL GEOGRAPHIC MAGAZINE November 1932



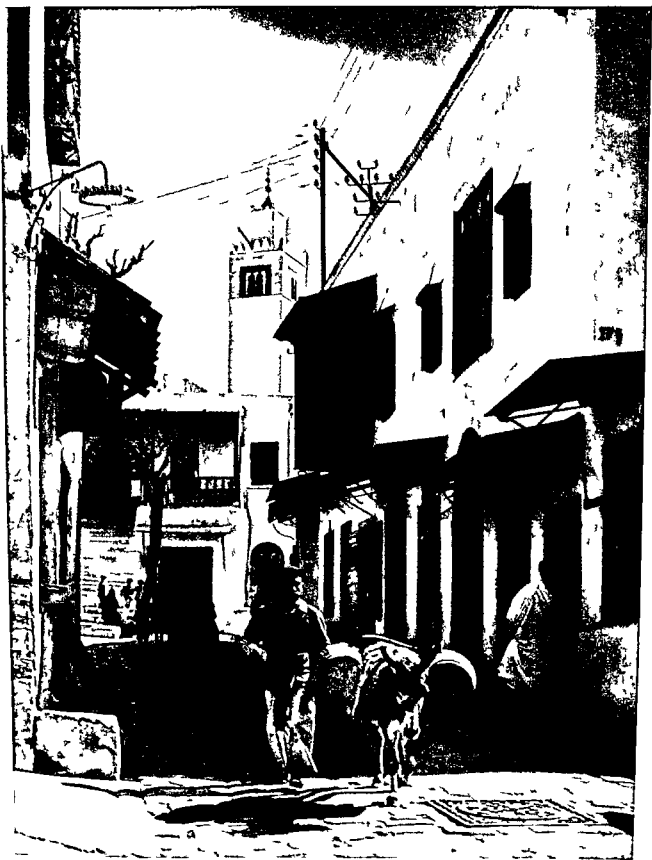
A SHIP OF THE DESERT RESISTS LAUNCHING

Persuasion fore and aft is needed to get the stubborn camel aboard the ferry which will take him from this mainland pier to the island of Djerba (page 364). Its golden sands stretching lo on the horizon this Isle of the Lotus Eaters is reputedly the place where Homer's hero Odysseus visited the dreamy indolent folk who subsisted on the fruit of lotus trees (pages 365-373).



MALE BLOSSOMS MAKE PALMS PRODUCE DATES ABUNDANTLY

To pollinate fruit-bearing trees these clusters in the market at Sfax are tied into the crowns of female trees. Thus man from time immemorial has supplemented the wind and insects in carrying pollen from palm to palm (page 34).



A FOUR FOOTED WATER CARRIER CLATTERS INTO SIDI BOU SAID

Its glistening white houses and square minaret perched on a cliff above the Gulf of Tunis this town is a favorite with visitors summer and winter. From the barred window projecting over the street (right) un ren women watch life go by. Around the corner the terraces of a restaurant command a wide view beyond Carthage to the mo lemn city of Tunis. Hamilcar's gardens occupied a site farther up this hill. A lighthouse stands to day where in Virgil's "Aeneid" D los funeral pyre blazed while Aeneas unknowing "held on his course and left the waters ways"



MARKET STALLS LINE MAIN STREET BENEATH A LOFTY MINARET

Until the French occupation neither Christian nor Jew was welcome within the walls of "Kairouan the Holy" during the annual Rug Fair in April the city teems with visitors who come to inspect the year's output of brilliant Zerbias thick Allouchas and embroidered Mergoums. Kairouan rugs whose production is fostered by the French Government. Annual prizes go to the best weavers and rugs bearing the official seal enter France free of duty.

while my lower lip froze to the thick metal bowl one subzero night in the Gobi.

He and his charming wife not only welcomed me to their home but also conducted me to Fom Tatahouine and Dou rat.

THE ROAD TO FOREIGN LEGION NOVELS

Fom Tatahouine used to be the terminus of the trail leading toward dunes, death and Foreign Legion novels. But big trucks now roll merrily along toward Bordj Le Boeuf and that web of desert tracks where Georges Marie Haardt and Louis Audouin Dubreuil blazed the way.

Neither Nigeria nor the Congo appealed

at the moment so I went to Ben Gardane near the Libyan frontier.

In normal times Ben Gardane is a small town around an empty market place. But when sanctions against Italy were imposed Ben Gardane was just the spot for silent footed camels. When people need olive oil, grain or soap a smuggler may be one's best friend.

Big trucks heavily loaded and decorated with horseshoes, fishes and hands of Fatima for all sorts of good luck. (page 374)

See "Conquest of the Sahara by the Automobile" NATIONAL GEOGRAPHIC MAGAZINE, January 1924.



FARMERS PACK THEIR DONKEYS TO GO HOME IN THE EVENING

Market day is over in Houmt Souk. The simple produce of the isolated domed farmhouse has been sold in the Djerban capital. Now the humble folk and their patient little beasts prepare to return home. Greek geographers identified this island with Homer's Lotus Land, and something of the sense of quiet content lingers on.

rolled down, charged the fleeting mirages above the chotts and dumped their bags and barrels at Ben Gardane. The market place swallowed them up, and padded feet, treading quiet trails toward Tripoli, vanished silently into the night.

Backtracking to Gabes, we started for Kebili, the Chott Djerid, and the oases at Tozeur and Nefta. Once Kebili was the back of the beyond, for from its sound footing near the west end of Djebel Tebaga it looked off over a deadly expanse—now salt heavy, water now blinding mineral deposits—which is kin to Death Valley and the Dead Sea.

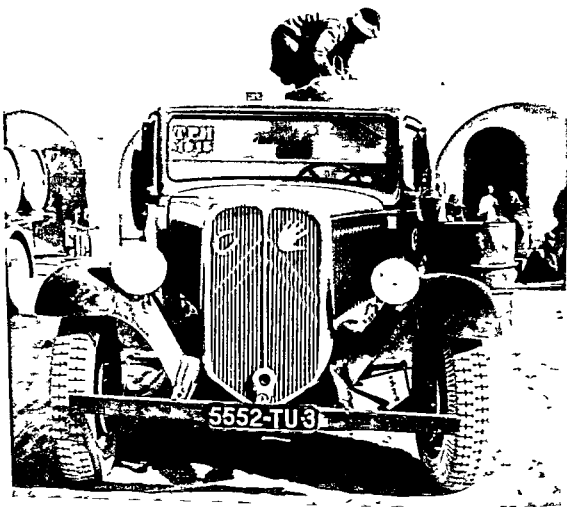
The Djerid takes its name from the

palms, but many of them are mirages. Even the phosphate-bearing mountains behind Metlaoui float in the hell-hot air.

WATER THEFT IS A HIGH CRIME IN A DESERT OASIS

A heavy wind had tossed some small dunes across the first part of our trail, delaying our progress. At the oasis of Tlemine, where a metal pipe shooting forth a crystal stream seemed poetic in its beauty, we stopped awhile. But the chott itself was as a French captain had promised, a billiard table.

Even a slight shower turns this billiard table to butter, in which wheels spin



GOOD LUCK EMBLEMS ADORN THIS FRENCH TRUCK'S RADIATOR

The native driver relies not only on the horseshoe and the protective hand of Fatima, but also on a velvet fish which he carries in the cab as an added safeguard against flooded roads or sand storms (page 372). Here at Ben Gardane he unloads drums of olive oil to be forwarded by camel to neighboring Italian Libya.

until the cars are engulfed. The desert nomad's dream of heaven must be, not pearly gates or streets of gold, but shade, palms and the voice of water.

Swelling dunes curve down to a clump of palms where camels rest and a long gowned Moslem kneels in prayer.

And well he may, for an oasis, however welcome to one from the desert, is no paradise for one who lives there. The supply of water, strictly limited, is divided by time or the width of a water notch cut in a cross-stream palm trunk. If the flow decreases, one longs to put his foot in his neighbor's channel and direct the precious water to his own thirsty fields, but a water

thief in an oasis is like a cattle rustler in the cow country (page 366).

Law and custom confuse the issue, for land is sold without water, and water without land. Inheritance divisions present problems in vulgar fractions which would break the back of a slide rule and sometimes do break heads. The Government taxing each tree, claims ownership of all the water. A palm grove is suspended, like a miracle, between death from thirst or taxes.

The actual physical work is not light. Trees must be trimmed and male flowers tied in the crowns of female trees (page 370). Rains affect the quantity and qual-



A JOLLY JEWISH SCHOOLMASTER LAUGHS AND JOKES WHILE TEACHING
THE K 2 — HEBREW A B C

He obliged his pupils out of the dark synagogue so the author could photograph them. These are descendants of the Jews who came by thousands to the island of Djerba after the destruction of Jerusalem in the first century A.D. (pages 366 and 379)

its of a crop rotting its fruit or causing it to drop to the earth useless for sale. Locusts sometimes leave a palm grove looking like massed chimneys and hangdog boot leggers of sour palm wine defying the laws of the Prophet and the Beys to get a kick out of fermented sap cut deep into the hearts of the tree tops.

The dream is irresistible the facts less lyric. To cross burning sands and then find the shade of the palms to hear the voice of still waters to wander at will among happy folk singing at their work—all that is possible. But how attain it?

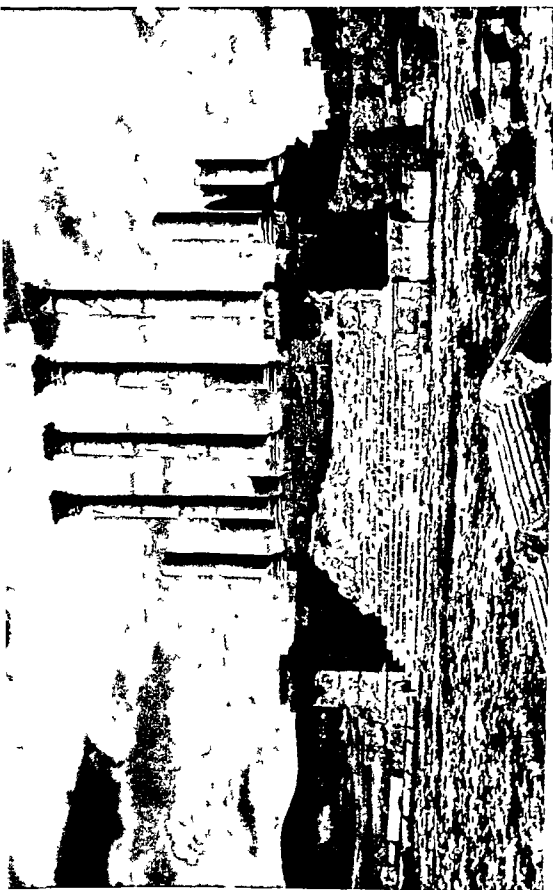
Pay me and I'll keep the others off promises one twelve-year-old gangster with

laughing eyes. Even in an oasis peace is a problem.

For all that a visit to Tozeur and Nefza is delightful. Where so many *khammes**—so named because for their labor they are entitled to a fifth of the crop—are singing as they trim their trees erect palm frond fences about their gardens or drag dusty peacock tails of palm leaf along the shady paths a sense of contentment quickly grows. And night brings benediction in its blue-gray veil.

The oasis of Tozeur should have 250 gallons of water a second but its 194 sources actually furnish only three-fourths

*Khamms five in Arabic



WITH FOUR LOFTY COLUMNS RESTORED, ARCHEOLOGISTS STILL HAVE MANY FALLEN ONLS TO PILCE TOGETHER

Fraxated during the World War by French scientists with the aid of German prisoners Thuburbo Majus deserves to be better known Founded by Augustus and reaching its full glory under the Antonine Emperors this Roman colony erected a statue of Jupiter now at Le Harlo whose head alone is nearly as tall as a woman Soaring aloft toward a stormy sky the four 27 foot columns of the Capitol erected A.D. 168 dominate the ancient forum (foreground)



FISHING BOATS CAST LONG EVENING SHADOWS ON THE VILLA-BORDERED BEACH AT HAMMAMET

Gleaming amid orange groves and fragrant jasmines, between highway and blue Mediterranean, stand the spacious winter homes and gardens of cosmopolites who have made this one of the world's most peaceful and romantic retreats. Within the time-browned walls of the old native town, behind the camera, live fishermen who supply the local market and add spots of color to the curve of shining sand.



THE FLUENT IRISH INFORMER REACHES SFAX

Victor McLaglen in his famous role gazes down on a crossroads not far from the Great Mosque. French dialogue was dubbed in at Paris but the Irish songs were left intact. Center of olive oil pressing, soapmaking, fish and phosphates, Sfax has a modern European town and this old quarter where men wear robes and bread is flat as a pancake.

that amount and only a few of its 200,000 palm trees, with their heads in the sun and their feet in the water, produce the sun-drenched and transparent *degla* date which is the pride of the Saharan oases.

Nefta from its plateau enjoys two views which more than make up for its own ugliness. Above a green sea of tossing palms there is a distant and hence pleasing scene of the deadly chott whose sole crop is mirages. And in an amphitheater as remarkable in its way as the Cirque de Gavarnie or that mountain-clasped clump of Lebanon cedars above Bcharreh there is a

cluster of palms with out equal. This is Nefta's famous *corbeille* or basket.

On sure-footed donkeys one rides down shady lanes to crystal sources and placid pools where palm trees leaning over to play Narcissus seem liable to suffer the same death. Then we descend to the bed of the brook and riding this liquid low way flanked by gardens come upon bronze boys happily splashing about and groups of women turning an alfresco laundry into a women's club.

Donkeys bearing water jars slung in panniers slide down slippery paths on dainty feet or to lurch philosophically upward to the dusty town paddling along with the help of waving ears.

To get a view I invaded the garden of a master of politeness whose first-born helped me find my way. Seated in a rude shelter on soft carpets the older men with well-groomed beards and spotless robes solemnly drank

scalding coffee and seemed to savor the beauty of this retreat I had come so far to see. But the son would have none of it.

Where is your home? he asked.

America, I replied, and was about to add New York lest he picture Rio or B A.

But there was no need.

That's what I want to see! The skyscrapers, the crowds in the streets, the electric signs, the big hotels. New York must be wonderful!

And your oases?

For old men who dream

I retreated toward Tozeur, with its giant jujube, its Byzantine tower, and its "Good morning, sir, give me silver."

A VETERINARY DISCOVERS PHOSPHATE DEPOSITS

Our route to Gafsa and Sbeitla lay past the Seldja Gorges (page 383) and Metlaoui, whose hero is Philippe Thomas, an army veterinary, who discovered phosphate deposits which yield upward of 2,000,000 tons of concentrated fertility a year.

But when low prices and Government restrictions force farmers to reduce their crops, why spend one's last few dollars on fertilizer? Cursed is he who makes two blades of grass grow where one grew before, for wine, olive oil (page 352), and phosphates are drugs on the market.

At Gafsa little boys plunge for coppers into well-kept mineral pools which date back beyond Jugurtha's day, and women crowd into covered bathhouses at a corner of the restored *kasbah* from which I retreated as soon as my wholly innocent entry stirred up the lions.

Sbeitla, as the dark-eyed wife of the Caid pointed out at a society tea near Tunis, is hard to reach. But to me it seemed well worth the effort.

AND THE GUARDIAN SLEPT ON

Diocletian's arch of triumph has been restored to something like its olden, golden glory. Three temples stand side by side behind a huge capitol, atop which, like Venus in her shell, the guardian sleeps.



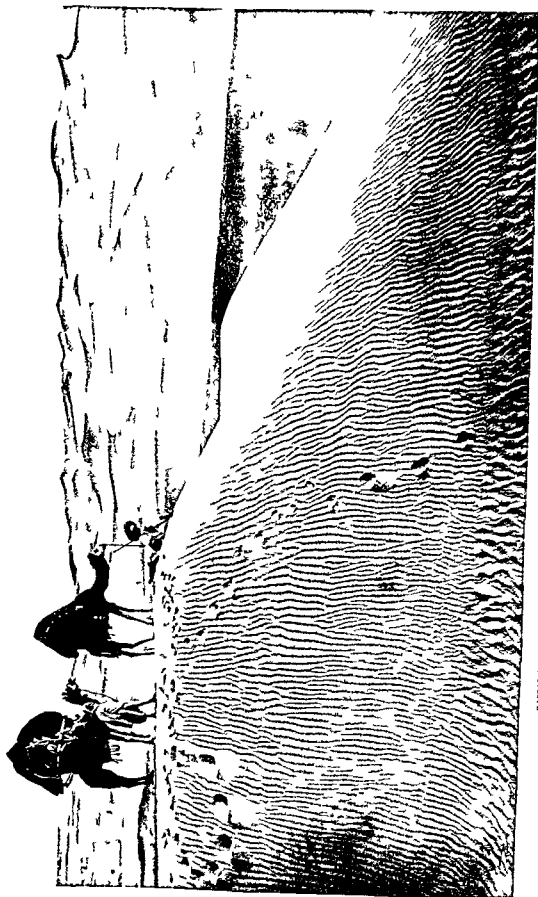
AROUND THE SACRED TORAH MASS THE JEWS OF HARA SRIRA

Children sit while their elders stand facing the altar during Saturday morning service at the synagogue, which Djerbans call "the Marvelous." When the author entered the dark room, he capped the lens of his camera, but rabbis courteously told him by signs that he might take photographs (page 366). Many pilgrims from afar visit this holy place.

I spent a wholly delightful afternoon at Sbeitla, the message of whose monuments was not interrupted by garbled French and in whose stony valleys native women not only washed clothes but welcomed me to their ideal laundry site.

After a brief foray to Tebessa and Timgad in Algeria, we re-entered Tunisia through the forest of cork oaks of Khroumirie, with its delightful summer resorts of Ain Draham and Camp des Chênes.

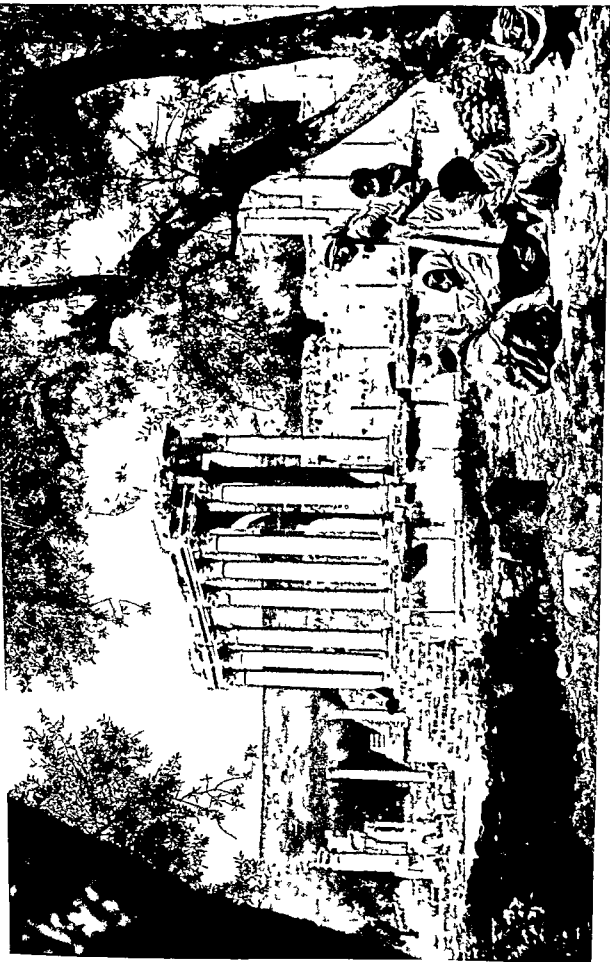
From the little port of Tabarka cargoes of yellow and red Numidian marble floated out toward Rome and romance, but except



SAHARA S SWELLING DUNLS BILLOW ON THE SOUTHERN FRONTIER OF TUNISIA

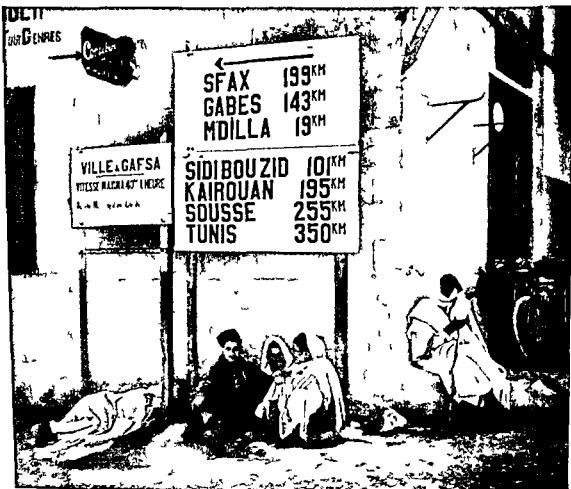
Photo by Lebert

Camels and gowned Moslems perch on the ocean of sand and long shadows at dusk. Roped by the sand and stamped with men's and camels' footprints, lonesome groves of oranges and lemons. In the north of Tunisia are fertile valleys planted to wheat and barley in its thick woods with chestnuts, oaks and and forth to the dunes of droghda and plenty. Palms fringe the southern marches, pastures cover the high tablelands and nomads move back.



OLIVE BRANCHES FRAME THIS TEMPLE TO CAELSTIS, THE HEAVENLY GODDESS

Only the foundation and a few columns remain of this shrine erected by a local patriot in the time of Emperor Alexander Severus. Since 1899 French archeologists have laid bare the central port on of Dougga's municipal center but this modest temple hides in an olive grove. Other Roman monuments in the ancient colony are among the most important in northern Africa (nature 187)



ONLY A BLIND MAN COULD LOSE HIS WAY FROM GAFSA

Good roads radiate in every direction from this town in the mountainous heart of Tunisia. Above the slumbering citizen a sign proclaims the municipal speed limit of 40 kilometers (about 25 miles) per hour. Surviving from Roman days are mineral water baths or swimming tanks where young natives dive for coins tossed in by visitors.

for the splendid descent through the forest where men strip bottle stoppers and cork bath mats off trees the trip to Tabarka was a disappointment.

DOUGGA'S UNWRITTEN FAME

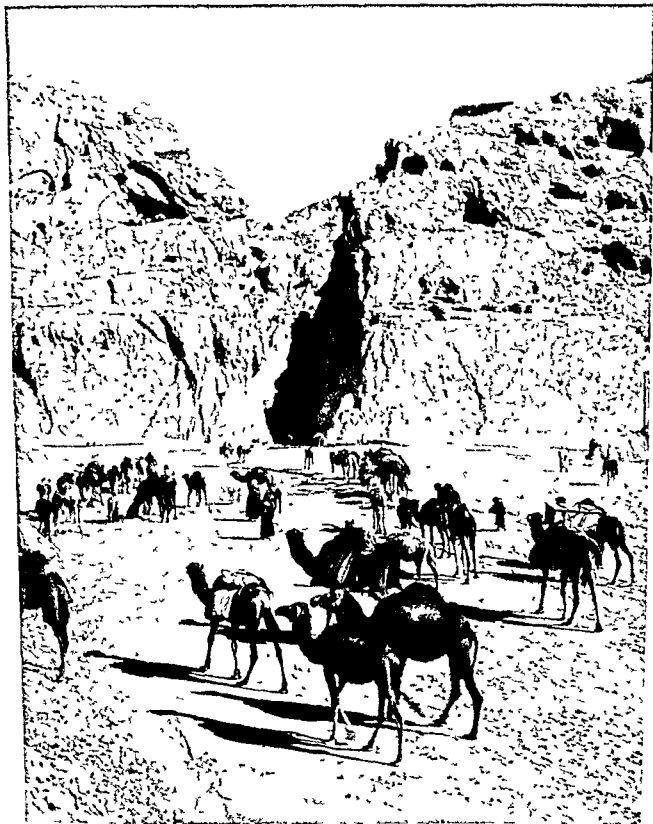
Not so Dougga, Tunisia's outdoor Bardo. Dougga rises above any written record describing its prime. From the Liby-Punic mausoleum up through olive groves past baths and latrines (more modern than anything the countryside now affords) to the maze of walls and mosaics below the Forum and Capitol, Dougga's stones suggest an importance and dignity which recorded history fails to confirm (p. 381).

Across the fertile valley a line of hills hides Zama, which may be the site of Hannibal's defeat by Scipio. One stands amid the majestic ruins of a city without a his-

tory and thinks of an epoch-making event whose site is unknown.

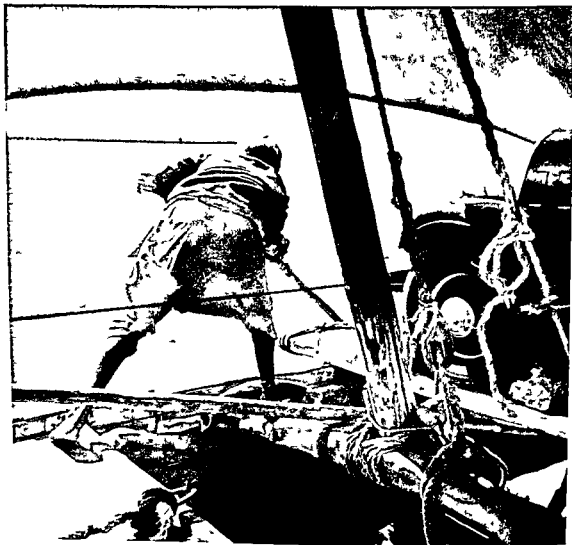
Closer to Tunis and reached by a road which enjoys wonderful views of Hadrian's aqueduct—attacked by Vandals, Arabs and Spanish but finally defeated by an underground pipe line—is the site of *Thuburbo Majus* (page 376). Jupiter's statue alone must have been as tall as a bungalow, since its head is five times life size.

Rome's petrified footprints are slowly crumbling away, but even in a dry and thirsty year Tunisia's gardens are worthy of note. Not cultivated corners of an equally colorful countryside are these products of sweat and persistence. Set between sand and sea—private oases rescued from salt as well as sun—they begin at a dusty gate outside which lies barrenness and thirst. Inside lies enchantment.



NOMADS AND THEIR CAMELS MEET THE IRON HORSE AT SELDJA GORGES

Rich in phosphates this defile is served by a narrow gauge railway running from Sfax to Metlaoui. A stretch of track crosses the rock slope behind the gap. Camels may drink from this stream which disappears in the sun baked desert farther south. Some two million tons of phosphates a year have been extracted here for use as fertilizer but the demand has fallen off since low prices for farm products have made production less profitable.



ON TWO BOATS LASHED SIDE BY SIDE THE CAR IS FERRIED AWAY FROM LOTUS LAND

The front of the author's machine rests on one boat the rear wheels on the other. There is room for only one sail so the barefoot deck hand helps by poling through the shallow water. On the horizon is the old Roman causeway linking Djerba (right) with the mainland. Half submerged this now serves as a foundation for a telegraph line.

For the thirteen years since I first saw it I have had in my heart the picture of a Tunisian paradise hanging between sky and sea. Where the snowy whiteness of Sidi Bou Said climbs a ruddy cliff from the sparkling gulf to a single minaret, one isolated palace with white peacocks hiding under purple cascades of bougainvillea stands out alone.

If Hamilcar's garden stood here the genius of Flaubert has done full credit to such glories as the Carthaginians knew. But could this hillside paradise ever have been more regally enchanting than it is to day?

Along a golden sickle of beach whose

time browned handle is the fortress town of Hammamet (page 377) are other delightful oases whose palms are orange and lemon trees whose inhabitants here find beauty after busy and adventurous careers.

Within one garden beside this blue sea stretching toward Malta there lives the leader of an expedition up the distant slopes of Everest.

What could be a greater contrast? There life stripped to its mere essentials, death holding the face cards and a jealous mountain spirit defending one of its last strongholds from dauntless man.

Here soft breezes, clear waters on clean sand, slipped servants and a lingering



POTTER'S CLAY LIKE VINEYARD GRAPES IS HANDLED WITH THE FEET

After mixing the clay will be kneaded on a stone beside the potter's wheel inside the white building. One craftsman living here at Nabeul is famed around the Mediterranean for his glazed and polychrome tile.

sense of deathless romance dating back to Dido's funeral pyre and Odysseus' loyal resistance to sirens.

Phoenician galleys passed this way. The glory of Greece and the grandeur of Rome touched these shores whose soft climate and quiet have caused a colony of villa owners to choose this spot, not far from the highway but facing the sea and sky.

RAIN IN A SUN PARCHED LAND

My happiest ride through all this land of the sun was through a rain which olive vine and palm tree had been craving for months.

Confined in a comradeship we had shared on distant Asiatic trails, I accompanied

Audouin Dubreuil on his return toward Zarzis. My travel through Tunisia was over. This ride together was a friendly leave-taking from a land to so many of whose beauties he had provided the key.

Long caravans plodded past the camels still disdainful of a fate which had turned the sheep to quilted skeletons and the horses to hang-head creatures almost too weak to stand.

Nomad women trudging along with children on their backs or riding the rolling bridges of their ships of the desert welcomed the driving rain which molded their dark gowns to their forms and added glitter to barbaric earrings, bracelets spiked like dog collars and those antique circular



STUCK IN A DUNE THE AUTHOR'S MISFORTUNE IS THE ARABS' GOOD LUCK.

Waiting for motorists to come to grief in the sand, these Berbers make pocket money by running to the rescue. The dune here is scarcely visible, but it stopped the car despite oversize tires. Tunisia has an extensive modern highway system, with bus services in many regions.

safety pins which serve as beauty straps to coarse blue gowns.

The travel-weary Bedouins gloried in the storm, for under its heavy barrage the famine that drove them north was in full retreat.

Camped in the plains near Tunis, like the army of mercenaries about the walls of ancient Carthage, were thousands of desert folk, fled thither from the Sahara's edge. During my travels, from the ruins of Carthage to the regions of sand and palms, we had honked our way through hundreds of north-bound caravans.

Now, on my last ride over the splendid Tunisian roads, the northward migration was slowing down in welcome mud. Life-giving rain had come again to push the dread Sahara back upon itself. The nomads' mankind's outposts would soon reoccupy what long-continued drought had turned to No Man's Land.

Au Foufou Dureuil, who knows and lives the desert, was sympathetic to this epic battle of the rain. But our hosts, the Sebastians, regretted the storm.

Their house is low and white, its small windows set in bulging little iron-barred

balconies such as Moslem women use as lookouts upon a world where they walk veiled.

Inside was almost unbroken whiteness where the very pictures—one a Iacovlevi*—do not break the lines of wall and vaulted ceiling, but stand on foot-high tables above rugs of zebra skins.

Outside the living room, rain spattered softly in the white-tiled swimming pool, and oranges shone on dripping trees. Between the branches were views of lazy waves and out toward Malta, blue sea and gray sky merged in mist.

All Nature shut us in. At table we conjured up scenes of desert and city, transatlantic liner and tractor-type car defying the Gobi. Boulevard and Broadway entered our conversation, but they made no sound. Travelers all here we met in that peace and quiet that bless the journey's end.

I wonder if Ithaca seemed as delightful to travel with Odysseus home at last from Lotus Land.

* See "Faces and Fashions of Asia's Changeless Tales," a painting by Alexandre Iacovlevi, National Geographic Magazine, January, 1936.

THE MEXICAN INDIAN FLYING POLE DANCE

By HEIGA LARSEN

OF THOSE age-old rites which still survive among the Indians of remote villages in Mexico, one of the most interesting and spectacular is the strange dance of the flying pole.

Although my sister and I had spent many years in the Mexican mountains studying Indian traditions and customs, we never had seen this ceremony. In a symbolism centuries old, the performers dance at the top of a tree trunk as tall as a ship's mast, then "fly" to earth on long, unwinding ropes (page 389).

Therefore, when we heard that the Otomi Indians were going to fly from their pole in Pahuatlan, we immediately packed our knapsacks and set out.

Pahuatlan is hidden away in the mountains of northwestern Puebla where a wedge of that State penetrates into the State of Hidalgo.

YAWNING RAVINES END RAILROAD AT HONEY

The train from Mexico City took us as far as Honey, so called because that was the name of the Englishman who built the rail way which ends there. All railways running northeast through the Valley of Mexico toward the Sierra stop abruptly where the first deep ravines plunge to a yawning depth and the sweep of the horizon is suddenly bruised by the contour of majestic ranges.

At Honey, which looks for all the world like a deserted western mining camp, we were met by Antonio, our Indian guide. After the usual fuss and flurry of loading the baggage on the pack mule, of saddling the horses and adjusting the ever too long stirrups which in this part of the country look like enormous wooden shoes, we left the straggling streets and soon were passing through a dense forest of pine and cedar.

Presently however, the country became more open and the horses patiently climbed the shoulder of a ridge that divided two beautiful valleys with sheer walls dropping to the rivers below. From here the trail pitched steeply downward for about ten miles making a drop of more than 3,000 feet.

The pine trees became small and stunted and finally surrendered to trees and plants of a more tropical climate. Small gray huts

with thatched roofs nearly touching the ground clung to the steep hillside and the green patchwork of cornfields climbed up and down almost perpendicular slopes. In front of us blue ranges lost themselves in the deeper blue of a vaulted sky behind us the world was hemmed in by dark wooded peaks.

BROWN FACES FLASH SMILES

The Sierra was teeming with life. Far above us, on the opposite side of the ravine, moving flecks of white showed where men were at work in their fields. Women were pounding clothes on large flat stones or filling brown clay jars with ice cold water from the waterfalls that shimmered against the green hills.

Indians with large crates on their backs were toiling over the steep grade. Their enormous loads, supported by a leather strap or a woven palm leaf band across the forehead, forced their bodies forward to counteract the heavy pull. With eyes riveted on the trail, brown faces taut and strained, square jaws set, they labored ahead—but there was always a soft spoken "adios" for the passer by and sometimes a flash of strong white teeth as a sweat dripping face was lifted to ours.

Flocks of goats were driven uphill by shouting boys, and the echo of high pitched voices of muleteers and the merry tinkle of their animals' bells floated on the air as large pack trains lumbered along carrying freight to and from Pahuatlan. The road is the pulsing artery through which flows the life of the Sierra.

A piece of green paper crushed in the hand gives a fair idea of the topography of the country surrounding Pahuatlan, which rests on a slope high above the point where two small rivers meet.

After almost three hours we sighted the town, coming upon it suddenly at a turn of the road. Below us the red tiled roofs of the houses peeped out from orchards and gardens.

ONE MODERN TOUCH RADIO ANTENNA

Pahuatlan cannot have changed much during the last few hundred years. The houses may have had a fresh coat of paint now and then and of course the radio has set its mark on the town. But, on the whole



Photograph by Rodney Gallop

CRESTED FLYERS PARADE TO THE TUNE OF THEIR ONE MAN FIFE AND DRUM CORPS

One daring young man whom the author met had flown for 35 of his 63 years. Not only is there danger of the pole breaking under the men's weight but a dancer may make a fatal misstep atop the mast particularly as some may drink heavily to buck up their courage. Most of the Indians have forgotten the symbolism of their sky dance but the spectacle is a treat for the youngsters who crowd the side lines here at Papantla (opposite page)

life flows along in much the same way as when the Spaniards built the first houses on the mountain side

In its outward aspect Pahuatlan is decidedly Spanish with deep archways and large iron studded doors that swing open to patios filled with flowers after the fashion of Seville. However, the conquerors have long ago gone to other realms and Pahuatlan has turned back upon itself and become Indian.

Our hotel, if one could call it that, opened onto a small patio behind a store. It smelled a bit sour, as strings of dried pigskins which the Indians use for carrying the fermented drink called pulque adorned its walls. But nothing mattered to us except sunshine the next day for the flying pole dance.

Darkness fell quickly and an ink black night was ushered in by a tropical rain which in a few minutes turned the narrow cobbled streets into rushing rivers. The continuous drip-drip from the roof on the dried pigskins sounded like the deep, sinister beat of an Aztec war drum.

We woke at daybreak to the same disheartening patter of falling rain, but even before Pahuatlan had time to brace itself to meet a new day, one of those surprising changes of weather typical of the Sierra took place. Clouds scudded away and a brilliant Mexican sun lit up the scene.

MARKET A BABEL OF INDIAN TONGUES

It was Sunday and the market was in full swing when we picked our way through the wet streets to the plaza which was crowded with Indians. All the tiny villages that hang like eagles' nests on the mountains around Pahuatlan empty themselves on Sunday and swarms of Indians in white starched clothes move up and down the narrow trails bound for the market.

The musical rhythm of several Indian languages flowed and ebbed through the archways around the sloping plaza, where natives bartered or haggled about prices exchanged gossip or sat in long silent rows with their wares piled up in front of them.

The women wore gorgeous hand loomed



Photograph by Rodney Calloz

INDIAN FLACPOLF SITTERS CAPPER ATOP A 70-FOOT MAST

At this dizzy height with feet stamping and headdress bobbing in time with a gourd rattle one actor dances while his five mates perch on a flimsy wooden frame. Each entertains the gaping crowd for about ten minutes. Then all leap into space and "fly" groundward on ropes (page 107). This traditional Indian ceremony, seen here at the Corpus Christi festival at Ixantla, Vera Cruz, survives in certain mountain villages in the northeast of Mexico City.



Photograph by Rodney Gallop

'HUMAN BIRDS' START UP THE POLE

Scarlet bandannas tied across their backs are supposed to be wings for in olden times the dancers were dressed as birds. Originally there were only four performers believed to represent the sacred birds which guarded the cardinal points of the compass. But now in Pahuatlán six flyers are more elegant than four. Indians told the author

shoulder capes embroidered in cross stitch patterns varying in design and color. Almost every village had its distinctive dress.

By far the most numerous were Otomí women from a village high in the mountains north of Pahuatlán. Their capes were of wool embroidered in striking patterns of black, red and yellow. Their long hair was braided with cords of wool ending in bright tassels of beads. The skirt, of wool or cotton was drawn tightly around the hips, with the fullness gathered into deep pleats in front which gave a singularly graceful

rhythm to their walk.

In the center of the bustling plaza towered the flying pole, almost seventy feet high and as straight as a mast—a magnificent tree, related to the pine. On some mountain slope it had grown, waiting to give up its life for an age old tradition. More than a hundred Indians had dragged it from its birthplace over the narrow path. How they had managed to get it around the sharp curves and across the ravines remains a mystery.

It must have been an arduous task to raise it on the small plaza. With levers and ropes the heavy trunk had little by little been lifted from the ground and slid into a deep, narrow hole in which the Indians had placed their offerings.

A live turkey, candles, chocolate, cigarettes,

and other things—varying in different parts of the Sierra—are put into the hole beforehand to nourish the pole and make it strong enough to hold the flyers.

LOFTY DANCE FLOOR TWO FEET IN DIAMETER

Three Indians were climbing to the top, carrying six long ropes and a short section of another tree hollowed out and smeared with pink soap. A thick vine had been twisted around the pole to afford a foothold. With difficulty the hollowed section was

placed on top of the pole, like a thimble on a finger, but free to revolve, and the six ropes were very carefully wound around the pole below it.

The top of this "thimble" was the dance floor. It measured exactly 24 inches in diameter as we were able to verify when it was taken down after the ceremony. This tiny platform, furthermore, was not level as six other ropes supporting a hexagonal frame passed over it in grooves.

The frame made of six sticks tied together with ropes was hung just below the thimble. Then the six long ropes which we had seen the Indians wind around the top of the pole were passed over the frame and the ends left dangling in the air.

Thereupon the Indians climbed down and we waited while clouds gathered on the mountains and rolled down toward the roofs of *Pahuatlan*. At one o'clock it rained and we were bitterly disappointed as we knew the Indians could not fly if the ropes got too wet.

But again the gods were kind. The rain stopped, the sky became clear once more and the gayly dressed *voladores* (flyers) finally entered the plaza.

Strangely enough not many historians have mentioned this old ceremony, only in a few places is it recorded in ancient Indian manuscripts.



Photograph by Bod I Ch ten en

HEADADDRESSES FLASH RAINBOW HUES AS DANCERS WHEEL

The stately Quetzal ceremony sometimes serves as a curtain raiser to the flying pole dance. Present day Indians weave the huge crests with paper strips instead of the brilliant macaw feathers used by their ancestors.

The ceremony of the *volador* is supposed to be intimately connected with the Indian calendar. It is believed to represent the Indian century or cycle of 52 years which was divided into four groups of 13 years each.

In the old Spanish chronicles there were always four *voladores*. They were dressed to represent birds—probably the four sacred birds guarding the cardinal points as each flyer corresponded to one of the four chief points of the compass. The flyers made thirteen rounds each before reaching the ground that is four times 13, or 52, the number of years in the cycle.



Photograph by B. D. Ch. en en

INDIAN JACIS ON THE BEANSTALK

The taller is a fresh vine twined about the pole. Reaching the top each man swings up to a seat on the six-sided frame. Below the cap or hub are four ropes on which they fly down. All carry rattles except the figure in flowing skirts who represents the Man Woman Malinche.

This symbolism has been almost entirely forgotten in the course of centuries though the Indians still raise their poles in the Sierra and fly as they did in very early days.

In Pahuatlán the symbolic number of four flyers has been changed to six. 'It is more elegant,' the Indians explained. 'Therefore we had a hexagonal frame and six ropes instead of four.' In other places, however, the natives still cling to the old number.

FLYERS WEAR BRIGHT RED

Our voladores wore bright red costumes and two bandannas crossed in the back gave a vague resemblance to wings. Five were dressed as men and the sixth as a woman. Malinche they called her. Almost all Mexican Indian dances have a Malinche or Man Woman but nobody seems to be able to explain the exact role played by this figure.

One by one they climbed to the lofty height. Malinche somewhat hindered by the long skirts fluttering in the wind. Once on top they sat down in the frame and supported their bodies by thrusting their feet against the pole. They looked very small—like bright rag dolls high up in the air.

Then one stepped up on the platform and commenced to dance. Five of the flyers carried rattles and the sixth a small drum and a flute that he played at the same time. The frail music floated down to us and the tiny figure whirled and leaped in time with its rhythm.

DANCING ON THE BRINK OF DEATH

Faster and faster he danced until my heart was in my throat. The thud of his feet echoed in my own pulse beat. One step misplaced, one slight loss of balance and nothing could have saved him from plunging to a sudden death.

Nothing happened and the dance went on to the four cardinal points. Each volador danced for about ten minutes except the one with the drum and flute.

The monotonous tune changed slightly for each new dancer and Malinche who was the last of all had four different tunes. She seemed to be the most important person in the ceremony and her dance was more intricate. Everyone gasped with fear when she stooped down and leaning forward at a dangerous angle enfolded each of the others with a large bandanna which she held in both hands.

After Malinche had slipped back to her



DRIED PIGSKINS ADORN THE PATIO OF PAHUATLAN'S HOTEL

Indians fill them with pulque the popular fermented drink made from the juice of maguey plants. Arriving in town for the flying pole dance men in pajamalike clothes park their mules in the courtyard



Photograph by Eudith Christensen

WORRIED BROWN FACES WATCH VILLAGE HEROES CLIMB THE POLE



Photograph by Ralph E. Gray

WHITE GARBIDO INDIANS WATCH NIN IN COLORFUL CLOAKS AND PLUMED HATS ENACT "THE BATTLE OF THE MOORS AND CHRISTIANS"
Part dance part play the ceremony symbolizes the struggle between good and evil. It was introduced into Mexico by the Roman Catholic Church to replace pagan dances. A character representing, Santiago (St. James) leads the Christians, Pontius Pilate heads the Moors. Here the 'battle' precedes the flying pole dance at Papantla



Photograph by Rodt Chensen

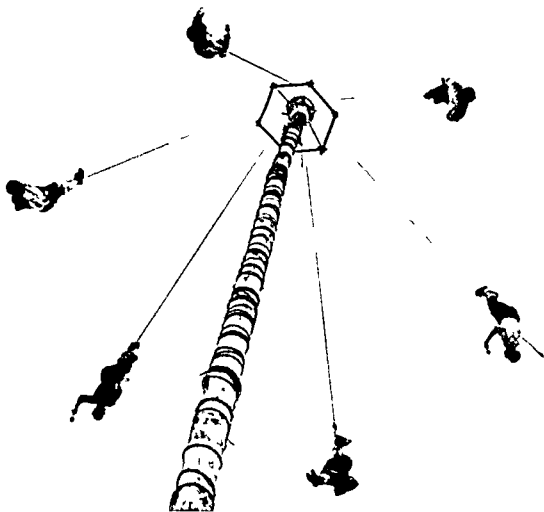
WILL THE POLE SNAP?—THIS UNVOICED FEAR LIES BEHIND THE MEN'S UPTURNED EYES



Photograph by Rodney Gasp

THIS VEILED WOMAN IS REALLY A MAN

Wearing an enormous plumed hat with shining mirrors, he plays the role of the Man Woman Malinche. Little is known about this traditional figure of the flying pole. Some believe "she" represents the Aztec girl who befriended Cortez, Spanish conqueror of Mexico.



Photograph by Rodney Gallop

DANGLING FROM A LOFTY MERRY GO ROUND, OTOMI INDIANS FLY THROUGH THE AIR

Dances over the actors suddenly dive from their seats atop the pole. Here ropes tied to their waists and wound about the masthead check their fall. As these life lines unwind the men descend slowly and revolve about the mast in an ever increasing circle until they touch the ground. Five of the men grab the rope with their feet and turn upside down at the start of the two minute descent, only the skirted Malinche (lower figure) remains upright.

place in the frame, all tied the ends of the ropes around their waists and with a piercing cry launched into space.

For one breathless moment they hung along the pole, five of them head down for only Malinche flies with her head up. Then down they came in a steady crescendo of ever widening circles.

As they gained momentum and the ropes slowly unwound, the effect of flying was perfect. Round and round the pole they flew, their slim bodies stretched along the ropes which they caught with their feet. The music had changed to a livelier rhythm accentuated by the drum and gourd rattles.

On the crowded plaza all commercial activities had ceased, and silent Indians with upturned brown faces intently watched the six whirling figures.

Then the fliers reached the ground, swinging gracefully around and landing on their feet. A deep throated cry arose from the plaza as the crowd broke like a surging wave and closed in around the voladores.

ACCIDENTS SOMETIMES MAR FIESTAS

Afterwards the fliers became our friends. They spoke Spanish haltingly, searching for words. They were men of different ages. The chief was 63 years old and had flown for 35 years. He had been the teacher of the others, who treated him with great respect. He told us about accidents and of voladores who had fallen to their death.

"We are helpless if anyone loses his balance," he said. "We can do nothing to help because we should all fall."

The whole structure is so frail and depends so entirely upon perfect balance that the least violent movement may be dangerous. In some villages the authorities have prohibited the dance because of accidents.

To have sufficient courage, many *voladores* often get quite drunk before climbing the pole. This of course makes them more reckless, and therefore a fiesta may end with the tragic death of a beloved flyer. *Voladores* enjoy much the same admiration and worship as that accorded a favorite bull fighter in Mexico City or a Babe Ruth in the United States.

Our flying Otomi Indians were not given to talk, and we feared that they knew nothing of the ancient symbolism of the ceremony. It was therefore a thrilling surprise when, as they were dismantling the pole, one of them turned to us and said:

"In the old days there were always four *voladores*, because we are really the four sacred birds that fly with the four winds to the cardinal points."

So, after all, a few embers of the old rite are still glowing in the dead ashes of yesterday. But before long they may disappear and the ceremony become a legend lost forever.

INDIAN DANCES ARE LIKE PAGES FROM FAIRY TALES

On our extensive trips through the Sierra we have seen many other interesting dances, each one like a brilliant page of a fairy tale book.

On the lower slopes of the mountains Totonac Indians with enormous rainbow-colored headdresses wheel around in their stately Quetzal Dance (page 391).

(The Acatlaxqui, or the Dance of the One Who Throws the Reed as the word literally means, has managed to survive in a few Aztec villages high in the Sierra. It is so little known that even the very best informed authorities on Mexico to whom we went for information had never heard of it, much less seen it.)

We saw it danced by Indians in costumes that reminded us of the *voladores*, but with tall peaked caps and flowing panaches of colored paper.

Each dancer held his *acatlaxqui*, which consisted of one long and a dozen or more short slender reeds adorned with brilliant feathers. The reeds were fastened so as to slide along one another to their full length, telescope fashion, when the dancer,

who held the longer reed in his hand, threw them into the air.

A circle of dancers surrounded a demure and miniature *Malinche*—a boy of eight with a dimpled girlish face, dressed in flowing white garments and holding a gourd and a small wooden snake painted silver in his hands.

At the beginning of the dance, *Malinche* stepped up on a small board and was hoisted high above the other dancers. The simple, monotonous tune played on a flute accompanied by a drum was almost drowned in the hilarious ringing of church bells and the startling reports of rockets bursting with small white puffs in the air.

But when the tiny figure commenced to dance on the board, holding "her" gleaming serpent high above "her" head, a hush fell on the spectators and the bells were silent.

Suddenly each dancer, with a graceful movement and a sweeping upward curve of the arm, threw his *acatlaxqui* into the air, while his feet never once lost the rhythm of the dance. A crackling sound, like the burning of dry twigs, blurred the music as the reeds shot out like arrows speeding from the string of a bow, and, crossing, formed a plumed dome of drooping arches over *Malinche*.

Again and again the frail tune was broken by the dry crackle as the dancers in some mysterious way made the reeds slide back into their hands, only to let them fly out once more.

WITCHES WORK BLACK MAGIC WITH PAPER DOLLS

Once, almost by chance, we stumbled into a strange Indian world peopled by supernatural beings.

We had noticed a cluster of small huts on a mountain in the Sierra and had questioned several people about it. The answer was always the same: the village was so unimportant and the Indians so secretive that few people ever went near it.

That decided us, and we turned our horses down the steep trail that plunged into the river, then rose in sharp curves and looped up the mountain.

A strange sound greeted us upon entering the village—a hard sounding clap-clap-clap not the soft patting of hands making tortillas, but the impact of stone on wood.

We found women sitting in the shade in front of their doors, pounding away on



Photograph by Rodney Gallop

THE MUSIC GOES ROUND AND ROUND, AS DAREDEVIL AERIALISTS SWING LOW

Still upside down and falling slowly the musician plays his pipe and drum while the others shake gourd rattles. Not until their blood suffused faces are about to scrape the ground will they right themselves and land gracefully on their feet. Otomi Indians watch from arcades and balconies ready to roar applause. As Mexico City worships a popular bullfighter so do these villagers admire the plucky flyers.

small boards with stones. They were making paper!

The pages of history suddenly turned back several hundred years. "And the paper on which they printed their hieroglyphs was fashioned from deer skin or pounded out of fiber extracted from the bark or roots of certain trees."

Today fiber paper is used for witchcraft only. The Indian uses two kinds of bark, one which gives a light and "good" paper and another which produces a dark purplish paper.

The latter is considered 'bad' and is used for black magic ceremonies. It is cut into small dolls with which witches are supposed to be able to cast spells on people, as well as to cure all kinds of illness.

In the Indian world which is much stranger than our own, everything—water, air, fire, earth, the house, the mountains—is represented by spirits which must be propitiated lest their wrath fall upon the defenseless village. The spirits demand offerings from the humble Indian, and weird ceremonies and rites are performed in their honor.

When an Indian is sick with fever it means that the fire has entered his body and is demanding its offering. The sorcerer, or *brujó*, drives out the evil spirit by coaxing it into a dark paper doll which is hurriedly burned and replaced by a good doll of light paper.

Should the patient die, the sorcerer of course is not to blame for is it not the fate of everyone to die? The unfortunate victim is buried with a couple of light paper dolls in his hand, these being good, will surely help him on his perilous journey to the land of shadows.

DROUGHT RELIEF, PRIMITIVE INDIAN STYLE

Whenever it happens that rain does not fall and the crops are threatened, the Indians flock to their sacred lagoon. An altar is raised on the shore of the deep, sinister looking pool and smoke rises from many incense burners.

Drums throb and flutes wail while strong feet stamp the ground and a chorus of voices entreat the water spirit—supposed

to dwell on the bottom of the pool—to release the life giving rain.*

One by one frightened fowl are hurled into the water, followed by yards of muslin, food flowers, paper dolls, and even money. The latter we heard later on, is sometimes retrieved by unbelieving muleteers who loiter on the trail waiting for the Indians to depart.

DOLLS REPRESENT PLANTS

In early spring, when ruffled fields lie pregnant with seed, the witches are busy cutting seed dolls for their clients. These are made of common tissue paper, as they must correspond in color to the plants they are supposed to represent.

Like the fiber paper dolls they are shaped like a human being with hands raised as if in prayer, but from the arms and legs sprouts the plant the Indian wishes to sow in his field.

In a cave high above the village, where the mountains seem to surge into the sky, the sorcerer chants his incantations over them and burns incense of copal gum. Then they are returned to their respective owners who reverently preserve them and take them out once in a while as an offering to the spirit that rules over the field and guards the crops.

These rites are faithfully carried out according to the different seasons and various needs of the villages because an instinct, strong and primeval, deep down in the Indian's soul, still urges him to follow his ancient traditions.

But, some day in the future, engineers will probably blast a modern highway through these tiny unexplored corners and the villages, some of which have not yet been put on the map, will be crushed under the grinding wheels of progress. The palm thatched huts will cede their place to up to date filling stations. Traditions will gradually disappear, the paper dolls will be forgotten and the strange and mysterious world of the Sierra will be no more.

* A custom somewhat similar but involving human sacrifice was practiced among the ancient inhabitants of Chichen Itza in Yucatan. See *Yucatan: Home of the Gifted Maya* by Sylvanus Griswold Morley in *THE NATIONAL GEOGRAPHIC MAGAZINE* for November 1936 page 622.



VOLUME LXXI

NUMBER FOUR

THE NATIONAL GEOGRAPHIC MAGAZINE

APRIL, 1937

TWENTY FOUR PAGES OF ILLUSTRATIONS IN FULL COLOR

The Genesis of the Williamsburg Restoration

JOHN D ROCKEFELLER JR

The Restoration of Colonial Williamsburg

With 21 Illustrations

W A R GOODWIN

Virginia's Colonial Heritage

25 Natural Color Photographs

GEOGRAPHIC STAFF

The Salzkammergut, a Playground of Austria

With 35 Illustrations

FLORENCE POLK HOLDING

An Austrian Album

13 Natural Color Photographs

HANS HILDENBRAND

Grand Canal Panorama

With 32 Illustrations

WILLARD PRICE

The Saguaro Forest

With 7 Illustrations

H L SHANTZ

Arizona Sands, Home of the Cactus King

11 Illustrations

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
WASHINGTON, D.C.

\$3.50 A YEAR

50c THE COPY

small boards with stones. They were making paper!

The pages of history suddenly turned back several hundred years. "And the paper on which they painted their hieroglyphs was fashioned from deer skin or pounded out of fiber extracted from the bark or roots of certain trees.

Today fiber paper is used for witchcraft only. The Indian uses two kinds of bark, one which gives a light and "good" paper and another which produces a dark purplish paper.

The latter is considered 'bad' and is used for black magic ceremonies. It is cut into small dolls with which witches are supposed to be able to cast spells on people as well as to cure all kinds of illness.

In the Indian world which is much stranger than our own, everything—water, air, fire, earth, the house, the mountains—is represented by spirits which must be propitiated lest their wrath fall upon the defenseless village. The spirits demand offerings from the humble Indian, and weird ceremonies and rites are performed in their honor.

When an Indian is sick with fever, it means that the fire has entered his body and is demanding its offering. The sorcerer or *brujo*, drives out the evil spirit by coaxing it into a dark paper doll which is hurriedly burned and replaced by a good doll of light paper.

Should the patient die, the sorcerer of course is not to blame for it is not the fate of everyone to die. The unfortunate victim is buried with a couple of light paper dolls in his hand, these, being good, will surely help him on his perilous journey to the land of shadows.

DROUGHT RELIEF PRIMITIVE INDIAN STYLE

Whenever it happens that rain does not fall and the crops are threatened, the Indians flock to their sacred lagoon. An altar is raised on the shore of the deep sinister looking pool and smoke rises from many incense burners.

Drums throb and flutes wail while strong feet stamp the ground and a chorus of voices entreat the water spirit—supposed

to dwell on the bottom of the pool—to release the life giving rain.*

One by one frightened fowl are hurled into the water, followed by yards of muslin, food, flowers, paper dolls, and even money. The latter, we heard later on, is sometimes retrieved by unbelieving muleteers who loiter on the trail waiting for the Indians to depart.

DOLLS REPRESENT PLANTS

In early spring, when ruffled fields lie pregnant with seed the witches are busy cutting seed dolls for their clients. These are made of common tissue paper, as they must correspond in color to the plants they are supposed to represent.

Like the fiber paper dolls, they are shaped like a human being with hands raised as if in prayer, but from the arms and legs sprouts the plant the Indian wishes to sow in his field.

In a cave high above the village, where the mountains seem to surge into the sky, the sorcerer chants his incantations over them and burns incense of copal gum. Then they are returned to their respective owners who reverently preserve them and take them out once in a while as an offering to the spirit that rules over the field and guards the crops.

These rites are faithfully carried out according to the different seasons and various needs of the villages, because an instinct, strong and primeval, deep down in the Indian's soul, still urges him to follow his ancient traditions.

But, some day in the future, engineers will probably blast a modern highway through these tiny unexplored corners and the villages, some of which have not yet been put on the map, will be crushed under the grinding wheels of progress. The palm thatched huts will cede their place to up-to-date filling stations. Traditions will gradually disappear, the paper dolls will be forgotten, and the strange and mysterious world of the Sierra will be no more.

* A custom somewhat similar but involving human sacrifice was practiced among the ancient inhabitants of Chichen Itza in Yucatan. See Yucatan "Home of the Gifted Maya" by Silvanus Griswold Morley in THE NATIONAL GEOGRAPHIC MAGAZINE for November 1936 page 622.



VOLUME LXXI

NUMBER FOUR

THE NATIONAL GEOGRAPHIC MAGAZINE

APRIL, 1937

TWENTY FOUR PAGES OF ILLUSTRATIONS IN FULL COLOR

The Genesis of the Williamsburg Restoration
JOHN D ROCKEFELLER JR

The Restoration of Colonial Williamsburg
With 21 Illustrations W A R GOODWIN

Virginia's Colonial Heritage
25 Natural Color Photographs GEOGRAPHIC STAFF

The Saizkammergut, a Playground of Austria
With 35 Illustrations FLORENCE POLK HOLDING

An Austrian Album
13 Natural Color Photographs HANS HILDENBRAND

Grand Canal Panorama
With 32 Illustrations WILLARD PRICE

The Saguaro Forest
With 7 Illustrations H L SHANTZ

Arizona Sands, Home of the Cactus King
11 Illustrations

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
WASHINGTON, D.C.

\$3.50 A YEAR

50c THE COPY

NATIONAL GEOGRAPHIC SOCIETY

GEOGRAPHIC ADMINISTRATION BUILDINGS

SIXTEENTH AND M STREETS NORTHWEST, WASHINGTON D C

GILBERT GROSVENOR, President
ROBERT V FLEMING, Treasurer
HERBERT A POOLE, Assistant Treasurer
LYMAN J BRIGGS, Chairman ALFVANDER WETMORE

JOHN OLIVER LA GORCE, Vice-President
GEORGE W HUTCHISON, Secretary
THOMAS W McANNEW, Assistant Secretary
Vice Chairman Committee on Research

EXECUTIVE STAFF OF THE NATIONAL GEOGRAPHIC MAGAZINE

GILBERT GROSVENOR, EDITOR

JOHN OLIVER LA GORCE, Associate Editor

J R HILDEBRAND
Assistant Editor
MELVILLE BELL GROSVENOR
Assistant Editor
McFALL KERBEY
Chief of School Service
LEO A BORAH
Editorial Staff

FREDERICK SIMPICH
Assistant Editor
ALBERT H BUMSTEAD
Chief Cartographer

E JOHN LONG
Editorial Staff

FRANKLIN L FISHER
Chief Illustrations Division
MAYNARD OWEN WILLIAMS
Chief Foreign Editorial Staff
CHARLES MARTIN
Chief Photographic Laboratory
LEONARD C ROY
Editorial Staff

BOARD OF TRUSTEES

ROBERT V FLEMING
President and Chairman of the
Board Riggs National Bank
WALTER S GIFFORD
President American Telephone and
Telegraph Co
DAVID FAIRCHILD
Special Agricultural Explorer U S
Department of Agriculture
C HART MERRIAM
Member National Academy of
Sciences
LYMAN J BRIGGS
Director National Bureau of
Standards
GEORGE R PUTNAM
Commissioner of Lighthouses
Retired
THEODORE W NOYES
Editor of The Evening Star
GEORGE W HUTCHISON
Secretary National Geographic
Society

CHARLES EVANS HUGHES
Chief Justice of the United States
WILLIAM V PRATT
Rear Admiral U S Navy Retired
RAYMOND S PATTON
Rear Admiral Director U S Coast
and Geodetic Survey
ALEXANDER WETMORE
Assistant Secretary Smithsonian
Institution
GILBERT GROSVENOR
Editor of National Geographic
Magazine
J HOWARD GORE
Prof Emeritus Mathematics The
George Washington University
FREDERICK V COVILLE
Botanist U S Department of
Agriculture
ELISHA HANSON
Lawyer and Naturalist

JOHN J PERSHING
General of the Armies of the
United States
GEORGE OTIS SMITH
Formerly Director U S Geological
Survey
O H TITTMANN
Formerly Superintendent U S
Coast and Geodetic Survey
JOHN OLIVER LA GORCE
Associate Editor of the National
Geographic Magazine
CHARLES G DAWES
Formerly Vice-President of the
United States
GEORGE SHIRAS JR
Formerly Member U S Con-
gress Faunal Naturalist and
Wild Game Photographer
OSCAR WESTOVER
Major General Chief U S Army
Air Corps
CHARLES F KETTERING
President General Motors Research
Corporation

ORGANIZED FOR 'THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE

To carry out the purposes for which it was founded forty nine years ago the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material which The Magazine can use generous remuneration is made. Contributions should be accompanied by addressed return envelope and postage.

Immediately after the terrific eruption of the world's largest crater Mt Katmai in Alaska a National Geographic Society expedition was sent to make observations on this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—The Valley of Ten Thousand Smokes—a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

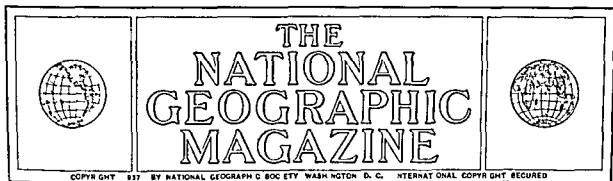
The Society cooperated with Dr William Beebe in a deep-sea exploration of undersea life off Bermuda during which a world record depth of 3,025 feet was attained August 15, 1934 enabling observations of hitherto unknown submarine creatures.

The Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary who discovered the North Pole and contributed \$100,000 to Admiral Byrd's Antarctic Expeditions.

The Society granted \$25,000 and in addition \$75,000 was given by individual members to the Government when the congressional appropriation for the purpose was insufficient and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

The Society's notable expeditions to New Mexico have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region The Society's researches have solved secrets that have puzzled historians for three hundred years. The Society is sponsoring an ornithological survey of Venezuela.

On November 11, 1935 in a flight sponsored jointly by the National Geographic Society and the U S Army Air Corps the world's largest balloon *Explorer II* ascended to an officially recognized altitude record of 72,395 feet. Capt Albert W Stevens and Capt Orvil A Anderson took aloft in the gondola nearly a ton of scientific instruments and obtained results of extraordinary value.



THE GENESIS OF THE WILLIAMSBURG RESTORATION

By JOHN D. ROCKEFELLER, JR

THE restoration of colonial Williamsburg enlisted my interest and support because to see beautiful and historic places and buildings disintegrating had long caused me very real distress.

It was this feeling that moved me to aid in the restoration of Versailles, Fontainebleau, and Reims. To undertake to preserve a single building when its environment has changed and is no longer in keeping, has always seemed to me unsatisfactory—much less worth while.

The restoration of Williamsburg, however, offered an opportunity to restore a complete area and free it entirely from alien or inharmonious surroundings as well as to preserve the beauty and charm of the old buildings and gardens of the city and its historic significance. Thus it made a unique and irresistible appeal.

As the work has progressed I have come to feel that perhaps an even greater value is the lesson that it teaches of the patriotism, high purpose, and unselfish devotion of our forefathers to the common good. If this proves to be true, any expenditure made there will be amply justified.

It was Dr. Goodwin who first dreamed of a restored Williamsburg. What has been accomplished is largely due to him, to my associates, to the architects, the builders and the historians. But of equal importance has been the truly wonderful co-operation, sympathy and understanding given the undertaking by the people of Williamsburg and of Virginia, both in official and in private life. From the very outset they have made the work a joy. Our association with them has been a continuing delight.

THE RESTORATION OF COLONIAL WILLIAMSBURG

By W A R GOODWIN

THE restoration of colonial Williamsburg is dedicated to the hope and purpose that the future may learn from the past." It is designed to preserve and re-create the symbols and memorials of a creative and colorful period of American history. The compelling reasons for its restoration lie in the historic background of the city, and in the intrinsic simplicity and alluring beauty of its architectural form.

Fortunately Williamsburg was built when life was simple. History here is symbolized by homes and venerable public buildings of harmonious and beautiful design.

Colonial Williamsburg grew from the seeds of thought and purpose which were planted by the devotees of liberty. It is necessary, if we would understand the significance of the restoration, that we should pause upon the portals of the city restored, and appraise the educational and social values inherent in its historical background.*

History enkindles the imagination of man and quickens his sense of reverence, thus prompting him to preserve the memorials of the creative past and enabling him to appreciate these memorials when he stands in their presence. The restoration of this colonial city, by making America more conscious of its heritage, will help to develop a more highly educated and consequently a more devoted spirit of patriotism.

VAST EXPANSE OF COLONIAL VIRGINIA

A map of the territory given to the Virginia Company by King James I under the royal charter of 1606 would show that it first embraced a strip of land, from 75 to 100 miles wide, extending along the Atlantic seaboard from what now is South Carolina to the present Canadian border.

Within these bounds, or just beyond, it then was confidently believed would be found the shores of the great western sea which would thence afford a near route to India and to other eastern lands.

* Captain Nathaniel Butler says in his *History of the Bermudas*: "Before we present you with the relation of matters of fact it is fit to offer to your view the stage whereon they were acted. For (it is well said) as geography without history seemeth a carcase without motion so history without geography wandereth as a vagrant without certain habitation."

Neither gold nor the shores of the Pacific Ocean having been discovered within this area, the charter of 1609 extended the bounds of the Colony to the shores of the western sea, wherever those shores might be. This territory in both documents was named Virginia.

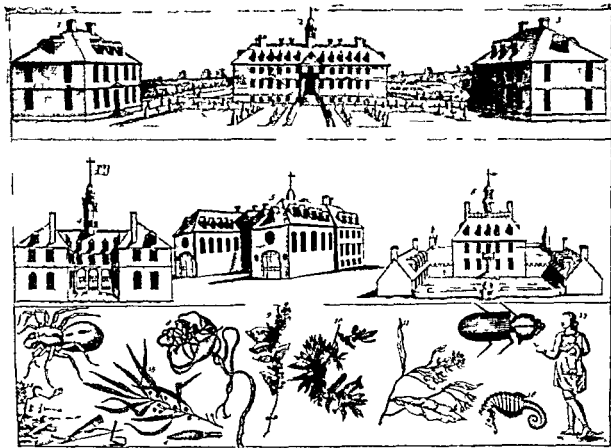
From time to time this area was curtailed by subsequent royal charters, or by ceded territory, so that in 1753 the Virginia territorial claims embraced the area now included in the western part of Pennsylvania, and the States of Virginia, West Virginia, Kentucky, Ohio, Indiana, and Illinois.

The area now included within the States of Michigan and Wisconsin was added and the Virginia claims were confirmed by the conquest, in 1779, of the Northwest Territory by George Rogers Clark.

'It has been held,' says the author of *A Brief and True Report Concerning Williamsburg and Virginia*, "that the History of the chief City of a Country is, in great Measure the History of that Country itself. And if there be any Truth in this Philosophy, it will be left to the Reader to judge how much greater would be that Truth if the chief City should also be the only City of Consequence in such a Country. For, through those Years of the Eighteenth Century in which it was the Metropolis of the Virginia Colony, Williamsburg was not only the Seat of Virginia's Government, but also the Principal Seat of its Religion, Education, Society, Commerce, and Fashion.

'Moreover, it enjoyed this unusual Distinction in a Colony which was then every where acknowledged to be the most populous the most powerful and the most prosperous of all Great Britain's Plantations in America so that though Williamsburg was in Virginia what Boston was in Massachusetts and what Philadelphia was in Pennsylvania, yet, due to its unusual Importance in Virginia and due to Virginia's Ascendancy among the Colonies, it was (although smaller in Size) in many Ways more potent than even those great Places.

Because this territory bordered on the American domain of the French, upon the other British colonies, upon the territory under Spanish dominion, and included within itself many Indian tribes, the



FROM THIS OLD DRAWING RESEARCH WORKERS OBTAINED CLUES FOR THE RE-BUILDING OF WILLIAMSBURG TO ITS OLD TIME GRANDEUR

The Bodleian Library Oxford England yielded one of the most valuable research finds made by the Restoration. The original copperplate engraved to scale about 1740 gave the only extant views of the Governor's Palace (6) and the first Williamsburg Capitol (4) (Plates 1 and 1). The plate was intended to illustrate a work on Virginia which was never published. The buildings flanking the Sir Christopher Wren building (2) are (1) the Brafferton Indian School (1723) and (3) the College President's House (1732). The sketch provided important information pertaining to the rear elevation of the Wren building (5). The panel at the bottom represents the early English idea of some of the natives and their customs as well as flora and fauna of the New World.

colonial government of Virginia, whose capital city was Williamsburg, was in frequent commercial, political, and military relationship with its territorial neighbors.

From these contacts grew the French and Indian wars and consequent military and trade agreements. These conditions gave to the government and people of Williamsburg reasons for interest and concern in the wars of England, France, and Spain and a cosmopolitan outlook upon world affairs.

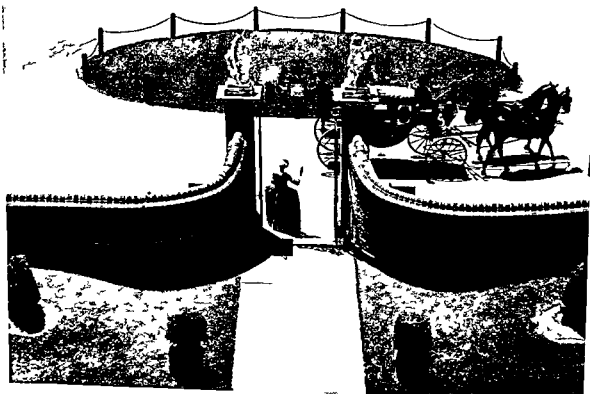
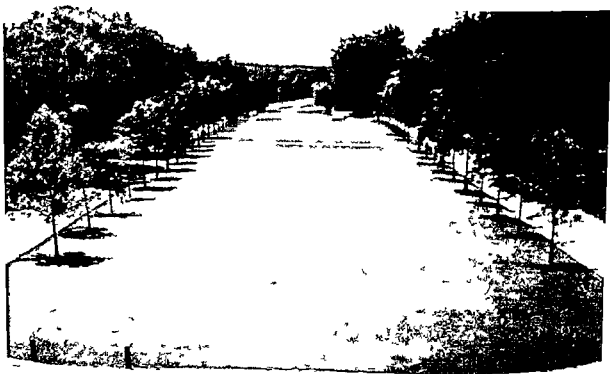
Jamestown, Williamsburg, and Yorktown located within a radius of 20 miles upon the Virginia peninsula which lies between the James River and the York are inseparably united. Williamsburg was the successor to Jamestown while the fame of Yorktown grew out of the high resolves initiated by the House of Burgesses in Williamsburg and

similar action taken in Massachusetts and the other Colonies.

These three places have recently been embraced within the bounds of the Colonial National Historical Park. Williamsburg however is not owned or controlled by the National Park Service. They now are being physically united by the Colonial National Historical Park Highway which has already been built from Yorktown to the outskirts of Williamsburg and is designed to be extended to Jamestown.

THE GLORY OF JAMESTOWN

The voices which echo from deserted Jamestown from the wilderness outposts of Middle Plantation and from Yorktown, must be heard if the voices which speak through Williamsburg restored are to be understood.



TWO SOLDIERS COULD HOLD THE GATE AGAINST MANY

© F S Lincoln

To modern visitors the narrow portal in the Palace wall seems out of scale but it was so constructed for defense (Plate VI). The Green forms the approach from the Duke of Gloucester Street. It was lined on either side by rows of trees which have now been replaced. The circle or turn around from which the original Carroll coach is drawing away (Plate II) is exactly in accordance with its dimensions as set down by Thomas Jefferson in one of his diaries (page 412).

The lone, ivy mantled church tower at Jamestown marks the beginning of the long vista through which Williamsburg must be viewed if it is to be seen in true perspective, for its glory is reflected upon Williamsburg.

Jamestown became the first permanent English settlement in America when, on May 13, 1607, the colonists landed there and named their place of settlement for King James.

There they built a church and later a statehouse and simple homes. There, in 1619, convened in the church the first representative legislative assembly held in the New World. There they tried communal government, which was soon followed by 'starving time'. There they had dealings with autocratic governors and took part in Bacon's Rebellion in 1676.

During this rebellion Jamestown was burned and Sir William Berkeley, the royal governor, who had roundly damned education, printing presses, and Bacon and his followers, made the rebellion of 1676 the prophecy of the Revolution of 1776.

Seasoning sickness and the abundance of other trials and discontents culminating in the fire which in 1698 again destroyed the Statehouse, brought to a climax the thought of abandoning Jamestown for a more nearly central location for the capital of the Colony.

THE MIDDLE PLANTATION

Near Jamestown midway between the James River and the York, was Middle Plantation, soon to become Williamsburg.

The seeds of this place had been sown by the Indians on a rampage in 1622 during which fully one third of the English settlers in Virginia were massacred.

Consequently, at a Grand Assembly of the Council and Burgesses holden at James City (Jamestown) in 1633 it was ordered that a palisade be built across the peninsula from estuaries of the James River and the York (about six miles) so that a region of safety for the inhabitants and their cattle might be secured extending eastward to Old Point Comfort, at the end of the peninsula.

The history of Middle Plantation so named because it was the middle plantation guarding the palisade is obscure except for a few outstanding events which entered into the near background of the making of Williamsburg and its subsequent fame.

Here Bacon's followers met to organize

the rebellion of 1676. This military uprising had its origin in the determination of the young Nathaniel Bacon and his followers to protect their homes from attacks by the Indians. The government objected to such military defense because of its financial interest in the Indian fur trade.

At Middle Plantation in October, 1677, with Jamestown lying in ashes, a Grand Assembly was held. About this time certain inhabitants of York County filed a petition with the King's Commissioners in which they offered the following supplication: And if a Towne be built for the Governor, Councill and Assembly to meet and for the General Court, we humbly propose the Middle Plantation as thought most fit, being the center of the country and also within Land most safe from foreign shipping, any place upon the River Side being liable to the Battery of their greatt Gunns.

SECOND COLLEGE IN THE UNITED STATES

Meanwhile, Middle Plantation had been chosen as the site of the second college in what is now the United States (Plate VIII and page 408).

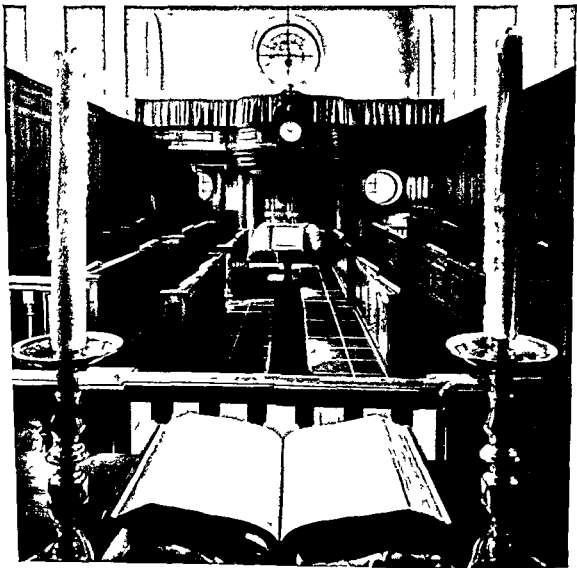
The College of William and Mary was destined to play a dominating part in the history of Virginia, in the establishment of Williamsburg as the second capital of colonial Virginia, and in the culmination of the thought of the restoration of Williamsburg.

Next to Harvard, established in 1636 William and Mary is the oldest institution of higher learning in the United States and the first college founded under royal charter.

In 1693 the Reverend Dr. James Blair, Commissary in Virginia of the Lord Bishop of London, and also minister of the church at Jamestown, obtained from King William and Queen Mary the royal charter for the building of the College of William and Mary in Virginia. The General Assembly ordered that Middle Plantation be the place for erecting the said college of William and Mary in Virginia and that the said college be at that place erected and built as neare the church now standing in Middle Plantation old fields as convenience will permitt.

And so the College was set down near the church and its location largely determined the site and plan of the future city of Williamsburg.

Its main building is known from contemporaneous evidence to have been designed by Sir Christopher Wren. It housed the



© F. S. Lincoln

BENEATH THE WREN BUILDING CHAPEL SLEEP THE COLONIAL GREAT

Lord Botetourt, Sir John Randolph, John Randolph the Tory, and Peyton Randolph, first President of the Continental Congress, are buried here. When the restoration began, the original arrangement of this chapel, where many generations of students of the College of William and Mary have attended services, had been altered, but it now appears as it did in colonial days.

professors and students and contained the kitchen, dining room, and great hall. A chapel was added in 1732 (above).

The College became the alma mater of three Presidents of the United States: Jefferson, Monroe, and Tyler, of George Washington, the first college professor of law in the United States (Plate VII), of Chief Justice John Marshall, and of many other distinguished patriots and statesmen.

Every aspect of Washington's public career began in Williamsburg.

He was not a student at William and Mary, but he came to the College to take

the required examination before the professor of mathematics and to be commissioned a county surveyor. This marked the beginning of his public service.

During the last years of his life he was chancellor of the College. As a young man he was commissioned by Governor Dinwiddie to service in the French and Indian wars, which was the beginning of his military career, as a representative of his county he served for many years in the House of Burgesses, which was the beginning of his political career, and he was sent by that body as a delegate to the Conti-

nental Congress
He married Mrs
Martha Custis,
who had a resi-
dence in Wil-
hamsburg

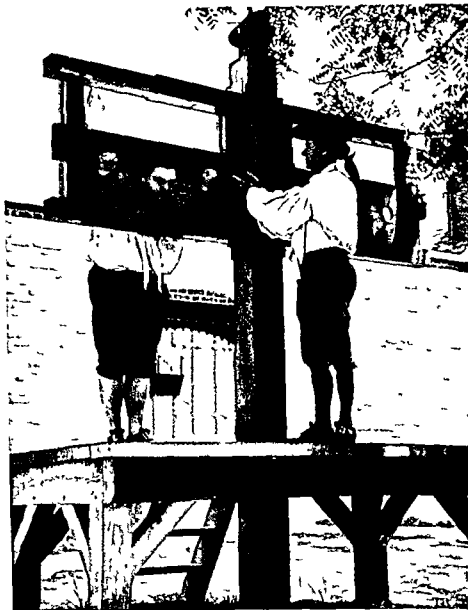
On December
5, 1776, the Phi
Beta Kappa So-
ciety was found-
ed by students
of William and
Mary

THE IRE OF GOVERNOR NICHOLSON

In 1699, the
capital of colo-
nial Virginia was
moved from
Jamestown to
Middle Plan-
tation, which,
because of this
decision, was
soon to become
Williamsburg.
The government
was installed in
the College where,
pending the build-
ing of the new
capitol, the Gen-
eral Assembly
held its meetings.

It is recorded
that His Excel-
lency Governor
Nicholson also
had his residence
at the College for
some time, which
lent no small dis-
tinction to the
institution. Yet
it is to be questioned whether His Excel-
lency's influence upon the scholars was of
the best. For, on one occasion at least, being
approached in the halls of the College by
one seeking money out of the public funds,
the Governor did fly into such a rage and
did curse and swear so loudly that a sea
captain who lay asleep at some distance in
the building, sprang from his bed and, neg-
lecting to fix his wooden leg, came leaping
through the halls in his shirt, thinking the
building to be afire.*

In calmer moments Governor Nicholson



Photograph by Edwin L. Washed

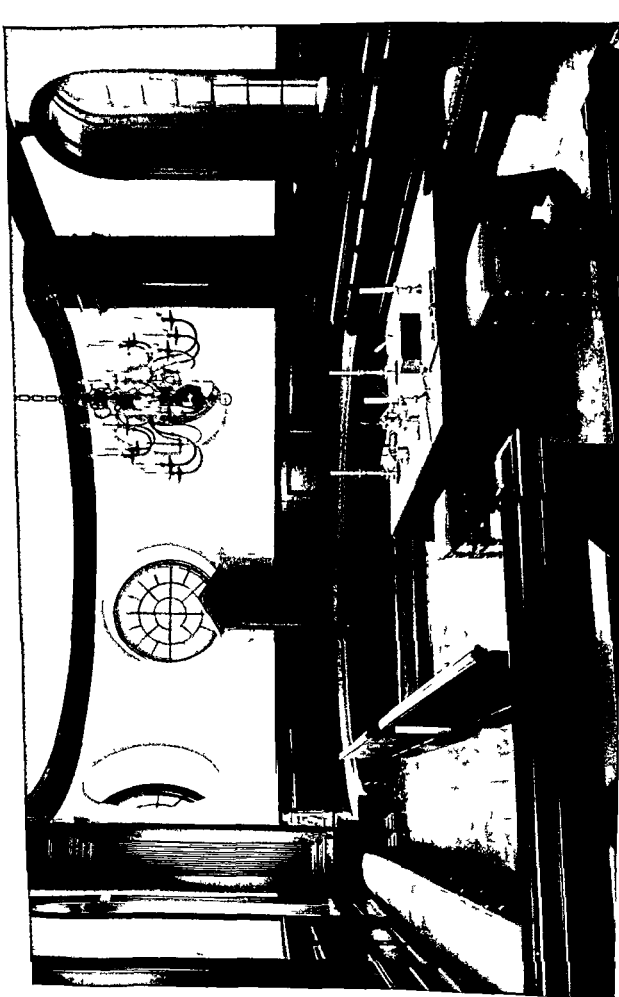
THE PILLORY GAVE PETTY CRIMINALS A FORETASTE OF HANGING

It may also have served in place of the whipping post though when it was
so used the victim would probably have been stood in a barrel to prevent his
kicking the wielder of the lash. Recently one William and Mary student editor,
who had his picture taken in such duress well nigh strangled before the 'gaoler'
came to release him.

was soon to have the city of Williamsburg
laid out and carefully planned, according to
the Act of the General Assembly, as the
second capital of the Colony of Virginia.

Lord Cornwallis came to the College and
occupied the President's House, erected in
1732, while on his way to entrench and
later to surrender himself and his army at
Yorktown. Officials of the medical staff
of the French Army were quartered in this
same house while taking care of the

* See 'A Brief and True Report Concern-
ing Williamsburg in Virginia, by R. G. Gent



© I S Lincoln

IF AN EARLY SPEAKER OF THE HOUSE OF BURGESSES RETURNED TODAY, HE WOULD FIND HIS OWN CHAIR AWAITING HIM

In the room of which this is a duplicate the House of Burgesses the oldest representative legislative body in North America convened from 1704 until 1747, when the first Williamsburg Capitol burned. The original speaker's chair was saved from the fire and again occupies its accustomed place



Photograph by Edward L. Weid

IN THIS JAIL GRIM PUNISHMENT OVERTOOK ONE ACCUSED OF
PURCHASING SCALPS

Captured at Vincennes, Indiana, by George Rogers Clark, Henry Hamilton, Tory governor of the Northwest, known as "The Hair Buyer," was imprisoned here because he incited the Indians against the colonists. Charged with offering bounties for white persons' scalps, he languished for months in a small, unheated, unglazed, and unfurnished cell in the Public Gaol during the Revolution (page 415). Many prisoners were locked in a single room and were further secured with handcuffs and leg irons riveted on

wounded French soldiers brought from the battlefields of Yorktown to be hospitalized in the Wren building at the College. During this time the College President's House was accidentally burned. The cost of repair was paid from the general fund of the French Army.

Today William and Mary has a faculty of 86 and a student body of more than 1,200.

It was about 150 years after this that Mr.

John D. Rockefeller, Jr., visited Williamsburg because of certain events of special interest connected with the College. In 1925 a dinner was given in New York City by the United Chapters of Phi Beta Kappa Society to stimulate interest in the plan to erect on the campus a memorial hall to the fifty founders of this society.

At the dinner an address was given on "The College of William and Mary and its Historical Environment." Mr. Rockefeller was present.

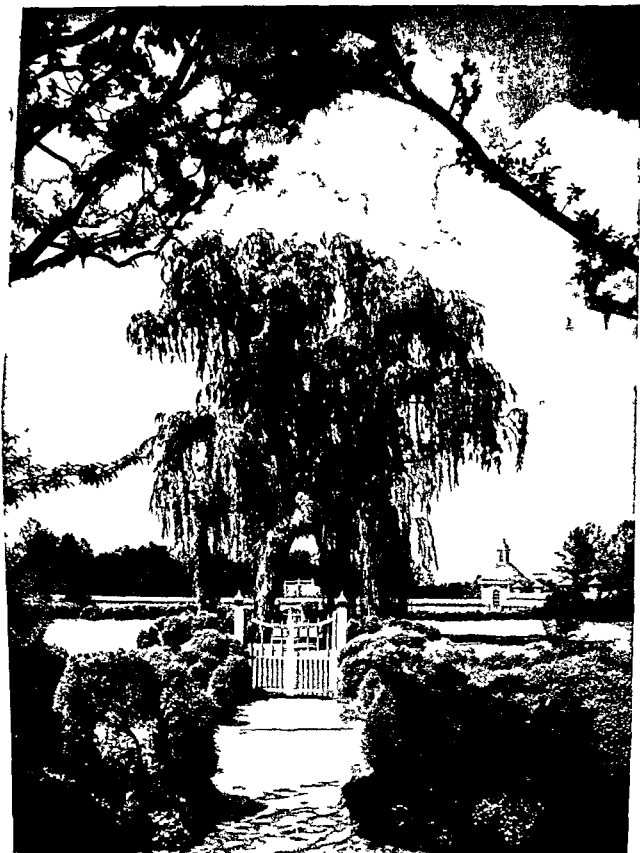
MR. ROCKEFELLER
VISITS
WILLIAMSBURG

After the dinner an invitation was extended to him to visit Williamsburg and this at a vast but at that time unforeseen cost to himself he accepted. He came the following year, viewed the city and its nearby points of interest, was introduced to the given glimpses of

ghosts of the past and restoration possibilities.

Mr. Rockefeller returned in 1926 to be present at the dedication of the Phi Beta Kappa Memorial Hall and at that time confidentially authorized the preparation of tentative plans showing what might be done to restore the Wren building at the College, the walls of which had in large measure withstood three devastating fires.

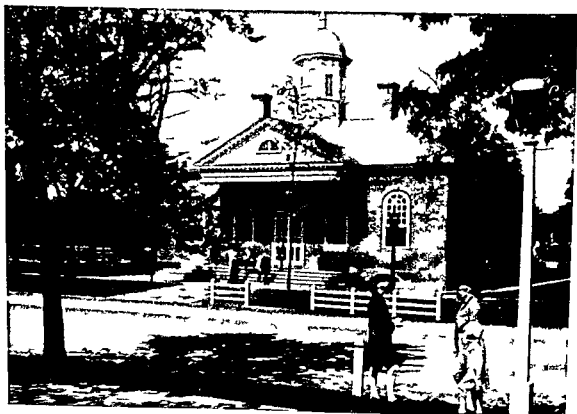
He further confidentially authorized the



HERE SLEEP SOLDIERS OF THE REVOLUTION

© F S L nco

One hundred and fifty six men of Washington's army and two women possibly nurses lie buried in the Palace garden. The willow tree stands in the center of their burying ground which had lain forgotten for more than a century. The graves were discovered when the estate was being restored. The Palace served as the hospital for the Continental troops during the Siege of Yorktown.



Photograph by Edwin L. Washard

WITHOUT COLUMNS THE OLD COURT HOUSE IS FAITHFUL TO TRADITION

Pillars were probably intended for the building which was erected at Williamsburg in 1700 but a sea accident perhaps or the rigors of the Revolution prevented their being supplied. Some were added after a fire in 1911, however the Restoration took them down. This edifice now contains the archeological exhibit (page 416)

preparation of preliminary drawings to help visualize the possibilities of the dream of a Williamsburg restoration. No further commitments of any kind were made or suggested at that time.

This momentous visit brought the restoration thought to the point which Governor Nicholson had reached in 1699. Plans had to be prepared. Nicholson's plans were for building a colonial capital city; now they were plans to visualize its possible restoration after the lapse of 227 years.

COLONIAL CITY PLANS

The plans of Nicholson's time were slightly delayed by the Governor who according to tradition suggested that the city be planned about a monogram of *W* and *M* in honor of King William and Queen Mary. The tops and bottoms of this monogram plan, however, ran inevitably into two neighboring ravines.

This plan therefore gave place to another on which the main thoroughfare extending from the College at the west

end and the Capitol site at the east was named the Duke of Gloucester Street in honor of His Highness William, Duke of Gloucester.

The two parallel streets on either side were named Francis and Nicholson for the Governor himself. The other streets were named then or later for the Kingdoms of Great Britain or in honor of people of distinction in England.

Near the center of the city spacious greens were laid out. One of these extending north from the Duke of Gloucester Street by the parish churchyard was planned as the foreground green and entrance to the Governor's House subsequently to be called the Palace (Plate X and page 404). Near the center of the town was a spacious open green designated Market Square.

The plan for the city and the directions for building the Capitol and the orders governing the erection of houses were clearly set forth in minute detail in the Act of the General Assembly. This Act was of



Photograph by Newton V. Bakeslee

LORD DUNMORE'S REMOVAL OF POWDER FROM THIS MAGAZINE KINDLED THE REVOLUTION IN VIRGINIA

After the surrender of Cornwallis it was used successively as a stable, church, dancing school, and during the Civil War as a Confederate arsenal (page 415)



Photograph by Edwin L. Washburn

OVER PIPE AND BOWL BURGESSSES TALKED REVOLUTION

The bartender of Raleigh Tavern could drop the portcullis like gate above the bar upon leaving his post with no fear that customers might reach for a drink (Plates II, III and page 416)



PLEACHED ARBORS OF BEECH DEFY THE SUN

© F. S. Lincoln

Hot summer days were passed pleasantly in the shade of unsupported tunnels of trees which flanked the ballroom garden of the Palace. Eventually the temporary wooden forms used by Restoration workers will be taken down and the trees will continue to grow in arches as in colonial times.

indispensable help in preparing the plans for the restoration.

There has been no occasion except by enlargements of the colonial city, for altering this colonial plan during the two centuries and a quarter and more since colonial Williamsburg was built. Along the streets and facing the greens then laid out were erected the public buildings and private homes of the city.

'SIT DOWN, MR. (GEORGE) WASHINGTON!'

The Capitol was completed in 1703, burned in 1747, rebuilt in 1751 and burned and abandoned in 1832. In this building met the Virginia Council, the Burgesses, the General Court and later the Government

of the Commonwealth, until the seat of government was removed to Richmond in 1779.

At the Capitol Patrick Henry made his 'Caesar Brutus' speech and offered his resolutions against the Stamp Act (Plates I and IV). Here the first steps were taken looking to the union of the Colonies. Here the resolutions were offered, and unanimously adopted calling upon the Continental Congress to declare the Colonies free and independent.

Here was adopted George Mason's Declaration of Rights and the first written constitution of a free and independent State and here Washington was publicly thanked for his gallant service in the French

and Indian wars

Being over come by embar rassment when he rose to reply Washington was addressed by Speaker Rob inson who said Sit down Mr Washington Your modesty is only equaled by your valor which surpasses any eloquence which I possess

TACKS AND TABLES

The Capitol of 1699 1747 has been rebuilt and completely furnished according to the original specifications which were specific to the extent of directing the material to be used in covering benches and the kind of tacks that were to affix and ornament the tape The dimensions of the tables were specified

The portraits then mentioned have been replaced by origi

nals of the period and others added including Charles Willson Peale's life-size likeness of General Washington Books and documents appropriately placed give to the Capitol an atmosphere of authenticity

Upon the completion of its restoration the General Assembly of Virginia held a formal session of the Legislature in the building on February 24 1934 The State Supreme Court of Appeals and the Governor of Virginia were officially present and took part in the proceedings Mr Rockefeller upon invitation of the General Assembly addressed the joint session in the hall of the House of Burgesses



© F S L a o n

BURIED STEPS CLEARLY ESTABLISHED THE FALL OF THE ORIGINAL TERRACES

The Palace burned in 1781 and its gardens fell into disuse Excavation uncovered parts of a stairway of precisely this character leading to the canal Enough fragments were intact to guide the rebuilding of the terraces and the stairs

The Public Gaol was erected in 1701 near the Capitol This building the ruins of which were still standing has been restored Here Blackbeard's pirates were imprisoned before being hanged To this prison also was brought General Henry Hamilton after Fort Vincennes which he commanded was captured by George Rogers Clark during the Revolution (page 410)

The Public Magazine was built upon the Market Square during the administration of Governor Alexander Spotswood in 1714 for the storing of All the Arms Gunpowder and Ammunition now in the Colony belonging to the King The removal of the

powder from this magazine on April 20 1775 the day after the Lexington Concord battle in Massachusetts precipitated the Revolution in Virginia

This building in a dilapidated condition was still standing when the restoration began Its encircling high wall had been torn down a number of years previously and the bricks used for a church

The building has now been restored and the encircling wall rebuilt (page 413) It is owned and kept open by the Association for the Preservation of Virginia Antiquities which was a pioneer society for preserving sites and buildings in Williamsburg and in Virginia prior to the restoration endeavor

FIRST THEATER IN THE UNITED STATES

Levingston's playhouse the first theater in the United States was built in 1716 near the Palace Green Near by was laid out a bowling green (Plate VIII) The site on which this building stood is owned by the Restoration but as yet the theater has not been rebuilt

Here plays some Shakespearean given under the patronage of the Governor provided popular entertainment and diversions for the people The emperor and empress of the Cherokee Nation attended a performance of Othello at Williamsburg's second theater built near the Capitol in 1751 The Indian queen was so alarmed by the fighting on the stage that it is related she sent one of her attendants to prevent the actors from killing each other

The Raleigh Tavern was erected prior to 1742 (Plates II and III and page 413) Burned in 1859 it has been rebuilt by the Restoration upon its original foundations after its original form and handsomely furnished with antiques of the period in accordance with colonial inventories listing the furniture that was in the building

Colonial Williamsburg abounded in taverns and ordinaries They were well patronized as they ministered not alone to those in attendance upon the government but to visitors to the city which was the commercial and social center of the Colony

Among the taverns the Raleigh stood pre-eminent—it was one of the most noted taverns in colonial America and was said by travelers to compare favorably with the best in England

Here the royal governors were officially banqueted upon their arrival from England here Washington according to his

diary, frequently dined here Jefferson danced with his fair Belinda here the Burgesses when dissolved for disloyal utterances prior to the Revolution met to carry on and here, in the Apollo Room the Phi Beta Kappa held its anniversary celebrations

SIFTING FORTY TONS OF ARTIFACTS

The old Courthouse built in 1770 has been restored and is used as the archeological museum and information center of the Restoration (pages 412-432) It contains specimens of colonial glass tableware hardware household utensils and building materials selected from some forty tons of such specimens of 17th and 18th century artifacts dug up while excavating the foundations of colonial Williamsburg houses

These exhibits have been of valuable assistance to the architects and others responsible for the building interior decoration and furnishing of colonial houses and constitute one of the most convincing proofs of the authenticity of the restoration

The colonial *Virginia Gazette* office was erected for printing a paper which began its valuable work of disseminating the freshest advices foreign and domestic in 1736 It has been one of the most valuable sources of historical information related to the problems of the Williamsburg restoration

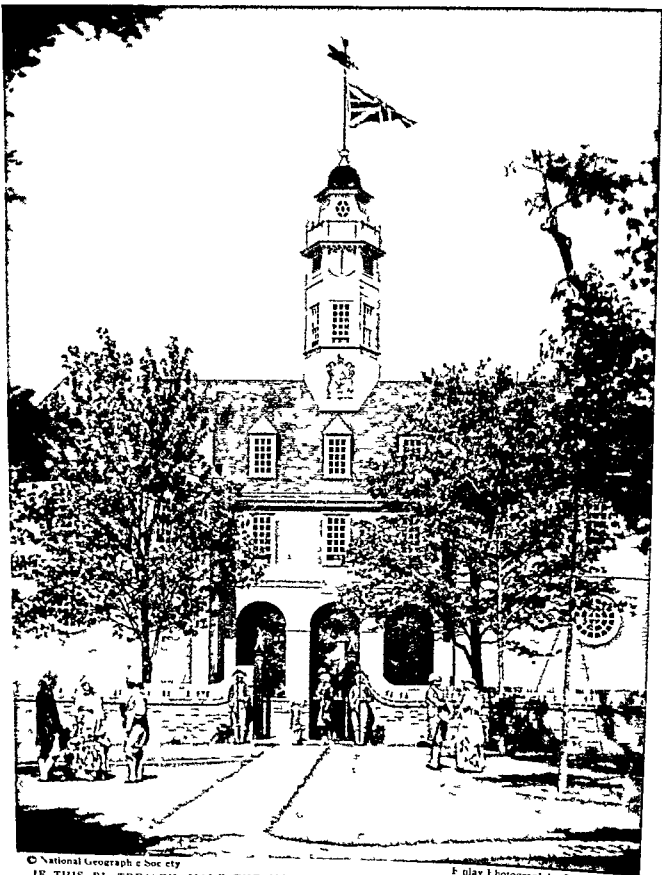
At its office in colonial days books were printed and sold and there for some time the colonial post office was established This building which was burned has not yet been rebuilt

BRUTON COURT CHURCH OF COLONIAL VIRGINIA

Bruton Parish Church is the successor to the church which was built soon after Middle Plantation was laid out and paved in In 1683 a new church built of brick was erected to take the place of the old church in this place (Plates VII-V and page 428)

After the seat of government had been established in Williamsburg a new church was built by the united efforts of the parish and the General Assembly in 1715 the Colony building the wings and intervening part and providing pews for the Governor the Council and the Burgesses Thus Bruton became the official court church of colonial Virginia

Bruton inherited the Jamestown traditions its Communion silver and its minister



© National Geographic Society

May 1 photograph by Lu s Marden

IF THIS BE TREASON MAKE THE MOST OF IT! CRIED PATRICK HENRY ON THIS SITE
 In 1765 the young Virginia statesman inveighed against the Stamp Act with Brutus Charles the First his Cromwell and George the Third Caesar had his George Washington George Wythe George Mason Thomas Nelson and other Revolutionary states men sat in the Virginia House of Burgesses in the old Williamsburg Capitol which stood here. It was built in 1699 1705 destroyed by fire and rebuilt half a century later again burned in 1832. Sponsored by Mr John D Rockefeller Jr the restoration erected this building on the original foundations according to specifications of the first structure (see Color Plate IV)



GUESTS ALIGHT FROM THE LOST CHAISE AT THE RALEIGH TAVERN

Owned by the Carroll family of Virginia this coach was made before the Revolution. It has been repaired, lined, and repainted with the same care used in restoring the colonial buildings.



© National Geographic Society

Play Photographs by Lu a Marden

THERE IS ONE CUSTOM THAT TIME HAS NOT CHANGED

Forbearers of the pickaninies who are up to their ears in watermelon probably received a similar treat from the soldiers of the Revolution. Costumes donned by the two men for this picture are of the very late Revolutionary period. In the Williamsburg restoration attendants in all of the exhibition buildings wear colonial dress.



Finlay Photograph by Lu s Marden

THE COUNCIL OF THE COLONY OF VIRGINIA WAS SUPPLIED WITH RED TAPE

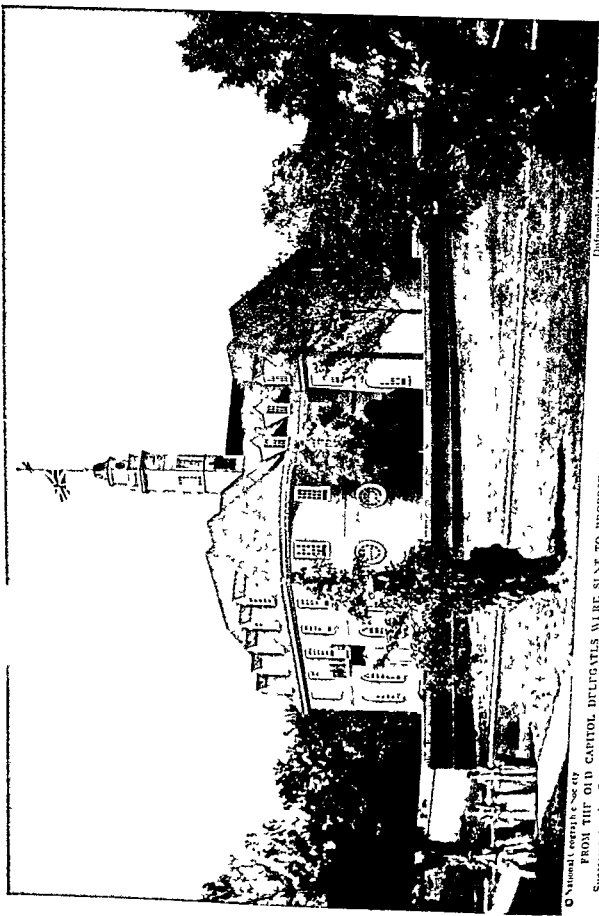
Six pieces of it used for tying documents together with brass candlesticks snuffers and snuff dishes, pen knives recording ink were ordered by Auditor William Byrd in 1705 for the lawmakers



Finlay Photograph by Edwin L. Wisberd

HERL IN RALEIGH TAVEN JEFFERSON DANCED WITH HIS FAIR BELINDA

In the Apollo Room beside a mantel bearing in Latin the inscription Jollity the Offspring of Wisdom and Good Living students of William and Mary held carnival Phi Beta Kappa had its banquets and Burgesses met The restoration has re-created accurately the building which when it burned in 1559 had been a social center in Williamsburg for more than a century

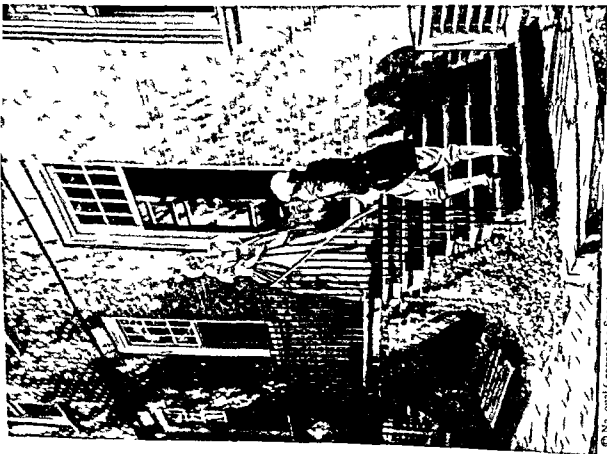


© National Geographic Society

FROM THE OLD CAPITOL DELUGED WIRE SLUT TO PROPOSE AND TO VOTE FOR THE DECLARATION OF INDEPENDENCE

Successor to the State Houses which had burned at Jamestown it was constructed without chimneys but in 1723 two were added on the clerk's complaint that the records were exposed by the damp. The Burgesses, however, told him he must buy his own fuel. It was a man's building and the three girls strolling along the wall in costume are probably as close to it as their colonial lady ancestors were permitted except at social functions which were sometimes held in the balling. The trees in the foreground are paper mulberries.

Dailycolor 11 photograph by Edwin L. Wisher



© National Geographic Society

A CAPRICIOUS LADY LIVED IN LUDWELL PARADISE HOUSE
 Lucy Ludwell Parand's mansion was built for her by her father, who had come to London to work for the East India Company. The house was built on the site of an old house, which had been built by the Ludwells in 1717. The house was built by Philip Ludwell, a founder of the Ludwell family, who had been little altered since it was first built.



© National Geographic Society

SUCH A COLONIAL DAME MIGHT HAVE BEEN TRIED IN COURT
 She could not have been coming out of the south archway of the Capitol in the Burgesses were in the Assembly (Plate IV). The iron railing surrounds the restored base on which stood the statue of Norborne Berkeley Baron de Botetourt, best beloved of the Royal Governors.



Finlay photograph by Edwin L. Wisner

WILLIAMSBURG PRIVATE GARDENS DELIGHT FLOWER LOVERS

Great care has been exercised in restoring this feature of the homes. The garden shown here belonged to John Custis, father-in-law of Martha Washington, who erected a tenement or house to rent on the Duke of Gloucester Street.



UNRECORDED VIEW

COLONIAL GOVERNORS' CHILDREN PLAYED BY THE PALACE FISHPOND

Part of the famous garden is in small corner of the grounds to its right and a narrow path leads to it. The garden is like the old trees and is a story of a kind of arrangement.



HERE LIVED GEORGE WYTHE TEACHER OF AMERICA'S GREAT

John Marshall Thomas Jefferson, James Monroe, and many others studied under the first college professor of law in America. The statesman was a signer of the Declaration of Independence. Washington made the house his headquarters before the siege of Yorktown.

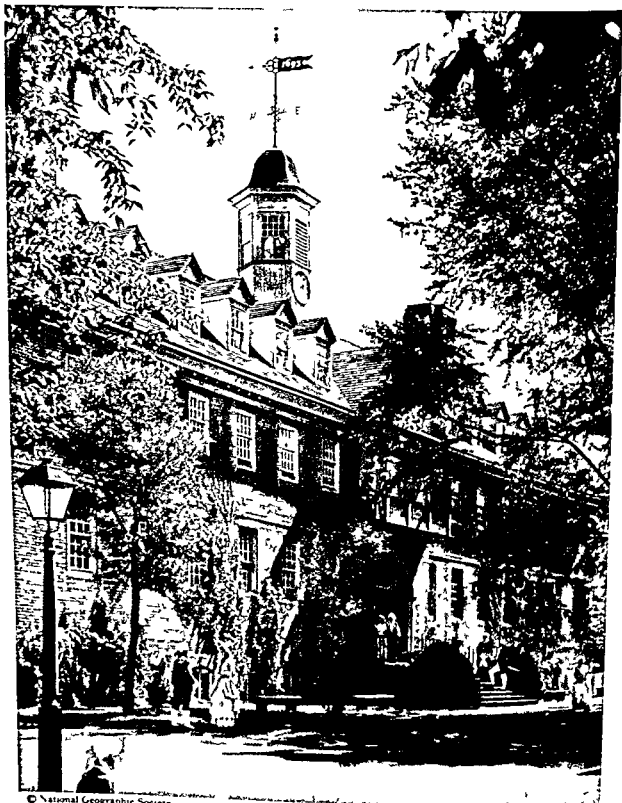


© National Geographic Society

Dufaycolor Photographs by Edwin L. Wisberd

THE GOVERNOR OCCUPIED THIS ROOMY PEN. STUDENTS WERE GALLERY PRISONERS.

Bruton Parish Church was attended by the young men from William and Mary, and just to make sure they stayed out the service their superiors had them locked in (Plate VV). Jefferson may have conceived here some of his ideas for his "Statute of Virginia for Religious Freedom."



© National Geographic Society

SIR CHRISTOPHER WREN

DESIGNED THIS THE OLDEST ACADEMIC BUILDING
IN THE UNITED STATES

May 1 photograph by Newton V. Blakeslee

The great British architect drew the plans for the main building of the College of William and Mary. Besides its use for education the edifice served as a meeting place for the General Assembly during construction of the Capitol and as the main hospital of the French in the course of the siege of Yorktown. It has been damaged by three fires but its outside walls are largely original. Bringing this structure identified as the work of the creator of St. Paul's Cathedral in London back to its colonial appearance was one of the first major projects of the Williamsburg restoration.

the Reverend Commissary Blair founder and first president of the College of William and Mary (page 405)

The partial restoration of Bruton Parish Church in 1904-07 represents the beginning of the thought of the restoration of colonial Williamsburg

In 1907 a lectern was given by President Theodore Roosevelt commemorating the 300th anniversary of the permanent establishment of the English Colony at Jamestown. A beautiful Bible given by King Edward VII commemorating the 300th anniversary of the establishment of the English Church in America was presented at the same service by the Lord Bishop of London

Statesmen of colonial Virginia associated with the government in Williamsburg from 1715 to 1779 worshiped in Bruton Parish Church. Washington's name occurs many times on the parish register in connection with the baptism of his slaves. This old register dates back to 1662

THE PALACE SO NAMED BECAUSE OF ITS COST

The Palace of the colonial royal governors was ordered built in 1705 but was long in construction because it was too ornate and expensive easily to win the lavish appropriations from the General Assembly necessary to finish it. Governor Spotswood brought it to completion about 1720 (Plates X, XI, XII, XIV, XVI and page 404)

Because of the frequency and size of these appropriations the Assembly became convinced that the building deserved the name of palace and so called it

All of the colonial governors of Virginia from Spotswood to Lord Dunmore resided there as did Patrick Henry and Thomas Jefferson the first two governors of the Commonwealth

A part of its spacious gardens became a burial place for the soldiers of the American Army of the Revolution while the Palace was being used as a hospital during the Siege of Yorktown (page 411)

Hugh Jones in his *Present State of Virginia* published in 1724 speaks of the Palace as a magnificent structure built at the public expense finished and beautified with Gates Fine Gardens Offices Walks a fine Canal Orchards. This I know se has the ornamental Addition of a good Cupola or Lanthorn illuminated with most of the Town upon Birth Nights and other Nights of occasional Rejoicings

The restoration of the Governor's Palace and the spacious grounds and beautiful gardens including the canal has been the climax of restoration endeavor

The finish of its interior woodwork its exquisite interior decoration the surpassing beauty of its varied terraced gardens its display of boxwood and holly hedges and of crape myrtle and other flowering trees and seasonal flowers among which roses abound constitute fitting symbols of what was most tasteful and ornate in colorful colonial Virginia (Plates VI and IX)

Within recent months the furnishing of the restored Palace has been nearly completed. An extensive collection of contemporary furniture and paintings has been obtained in England. These match the descriptions of the furnishings in every room given in the inventories of the colonial governors

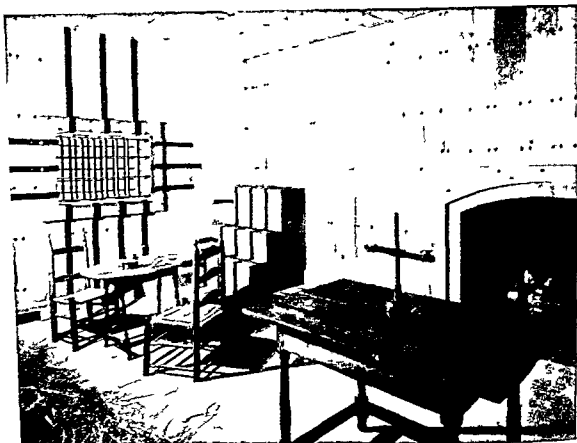
The restored homes of colonial Williamsburg are many and varied. They are surrounded by recreated gardens and face upon old greens and historic streets. Some are held under life tenure agreements graciously allowed. A few will be opened as exhibition buildings. All of them add to the making of the harmony and scale of the city restored and to the completion of a colorful picture of a memorable past

THE FIRST COLLEGE PROFESSOR OF LAW

The Wythe House was the home of George Wythe first college professor of law in the Colonies teacher of Jefferson Monroe and Marshall and of other notable statesmen. Wythe was a Signer of the Declaration of Independence (Plate VII)

Built in 1755 the house was purchased with the aid of Chapter III Colonial Dames of America when fast falling into decay. Thus its preservation was secured and Bruton Parish Church adjoining protected. While this restoration was in progress under direction of the Rector of Bruton Mr William G. Perry of the firm of Perry Shaw and Hepburn of Boston visited Williamsburg on a vacation study of the colonial architecture of Virginia. Dropping in at the Wythe House he sensed the need for counsel and kindly gave helpful advice

His acquaintance later led to the selection of Mr Perry and his associates as the architects of the Williamsburg Restoration. In this house and probably in the room which had been occupied successively by Washington and Rochambeau during the Yorktown campaign the preliminary



© F. S. Linco

IMPRISONED DEBTORS WERE PAMPERED IN COLONIAL VIRGINIA

When a new house for the gaoler was added to the Public Gaol at Williamsburg his old quarters fireplace and all were assigned to those who were forced to serve time for nonpayment of their bills. Criminal offenders enjoyed no such comforts (illustration page 410). The room was sheathed with heavy oak boards. Even the steeple convenience in the corner was strongly re-enforced with iron and built so that it was escape proof.

sketches showing the possibilities of the restoration of the Wren building at the College, and of colonial Williamsburg were first shown to Mr. Rockefeller, on May 21, 1927.

The Wythe House is soon to pass from the church to the Restoration.

WHY WILLIAMSBURG WAS CHOSEN FOR RESTORATION

This city, so rich in historic association and time encrusted beauty, offered the one feasible opportunity to reclaim and restore a colonial center.

Of four cities pre-eminent in America's early history, and especially potent in shaping pre-Revolutionary thought which led to the establishment of our Republic, Williamsburg alone seemed to lend itself to such a project.

Obviously, an area a mile long and approximately a half mile wide could not have

been secured for restoration of colonial Boston with Faneuil Hall as its center nor in colonial New York with old Trinity Church as its center nor in colonial Philadelphia around Independence Hall.

In Williamsburg there still stood about 95 colonial buildings of various kinds within a relatively small area, largely surrounded by an unspoiled countryside.

SECRECY ESSENTIAL TO EARLY STAGES

At the outset complete secrecy was essential to the success of the Restoration endeavor. The preliminary plans were made from measurements of the streets and properties of Williamsburg taken by Mr. Perry and two assistants in the quiet darkness between midnight and dawn.

No one became aware of their strange procedure save one negro who wandering through the blackness of the night, came unawares upon a steel tapeline being

dragged across an intersecting street along which, in a somewhat befuddled condition, he was seeking to find his way home. With a terrified yell he leaped over the line and vanished into the night.

Photographs were taken from the air and pieced together, and early maps, including the Frenchman's map of 1782 (page 431), were consulted. Preliminary historical investigations were made to evaluate the properties. Neither Mr. Perry nor the airplane photographer knew for what mysterious purpose these things were being done.

At length preliminary plans of much wider scope than the sketches shown in the Wythe House in 1927 were viewed by Mr. Rockefeller and a few of his confidential associates in a private room of a New York hotel on November 21, 1927. Soon thereafter authority was given to proceed with the purchase of property essential to the beginnings of the restoration endeavor.

From the outset it was recognized that the value of the restoration would be its authenticity. So that the plans and material structure, the outward architectural form and the artistry of interior decoration as well as the furnishings in the restored buildings, might be truthful portrayals, a research organization was constituted.



© F. S. Lincoln

OVER THE MAUPIN GARDEN FENCE, WHAT LOVERS SAID GOODBYE?

Persons having Lots contiguous to the great Streets shall enclose the said Lots with a Wall Pales or Post and Rails. So read the act for establishing the Capitol at Williamsburg in 1699 and again after a lapse of 238 years, it has been complied with.

Every possible source of documentary evidence in America, in England, in France, and elsewhere, that offered any hope, was searched by trained investigators. American national and State historical societies, museums, and libraries were visited. Research students were sent to England to examine the records in the British Museum, the Public Record Office, the university libraries, and other public and private collections of old manuscript material.

Mr. Warrington Dawson, of the American Embassy in Paris, combed the archives of France for evidence that might have



DR W A R GOODWIN, RECTOR OF BRUTON PARISH CHURCH, CONCEIVED THE IDEA OF RESTORING WILLIAMSBURG

OF F N L N C N

At first, having little money, he levied his efforts mainly to this building (1710-15) which was thus brought back to its original appearance. Thanks to George Washington and to other famous men who once visited here (1791 and 1800), the church is still an important landmark.



Photograph by Edwin L. Witherd

DESCENDANTS OF THE FIRST OWNER STILL OCCUPY THE ST. GEORGE TUCKER HOUSE

"The American Blackstone," St George Tucker, famous for his literary, and legal works, "assembled" this handsome residence near the Palace Green about 1788. Probably he moved an old house to the site and added wings to it. On this property stood the Williamsburg theater, which was built in 1716, and research indicates that some part of it is included in the present structure.



SHOPKEEPERS OFTEN LIVED AT THEIR PLACES OF BUSINESS

This small shop known as the Forge and Wheel was probably built to rent by Christopher Ayscough a Palace gardener and his wife Ann. Mrs. Ayscough had been Governor Fauquier's cook and received a handsome bequest at his death which legacy may explain the couple's real estate holdings near the Capitol. Restoration architects discovered the original framework under a boxlike second story; re-creation produced this result.



Photographs by Edwin L. Ward

PETTY OFFENDERS BEHARF!

Punishment in themselves the stocks of colonial days inspired onlookers to torment their prisoners and this was usually contemplated in the sentences of the lesser courts. Sticks and stones and ripe vegetables and riper epithets were hurled at random.



Photograph by Newton A. Blakeslee

EVEN MODERN BUSINESS HAS "GOING COLONIAL"

When restoration began this shopping center of Williamsburg was the usual row of small buildings many of them badly dilapidated. Graceless structures with unattractive signs were torn down and replaced by new ones of Tidewater Virginia colonial architecture. The stores harmonize with the restored area and the advertising signs with those of Washington's day.

found its way there from the officers and soldiers quartered in Williamsburg for several months after the Battle of Yorktown. Valuable source material was discovered.

In the library of the College hung the famous map of the unknown Frenchman. It has become known as the "Bible of the Restoration." This map designates to scale every public and private building in colonial Williamsburg as of 1782, when the legend on the map, written in French, shows it to have been drawn.

A CHILD'S SCRAPBOOK YIELDS FACTS

A child's scrapbook of the colonial period, found in Williamsburg, contained a pen sketch of the rear of the Wren building with notes designating the professors who taught in the various classrooms and the students who then occupied the dormer windowed rooms of this building.

In the Huntington Library in California was found a floor plan of this main college building drawn by Thomas Jefferson. A floor plan of the Palace made by Jefferson was located in the Massachusetts Historical Society.

The most spectacular find was made by a research worker in the Bodleian Library, at Oxford—a copperplate engraved about 1740 showing the elevations of all the colonial College buildings, the Capitol of 1704, and also the Palace with its contemporaneous flanking buildings (page 403). The plate was immediately photographed and transmitted by radio to America.

Numerous other confirming and revealing evidences came to light, establishing the authenticity of architectural designs.

In the College library hung a tracing of a drawing of the College made by a Swiss traveler, Francis Louis Michel, who had visited Williamsburg in 1702. Among the College archives were reproductions of other sketches made by him showing the semicircular walls of the south end of the Capitol, then in construction.

A LOST ART REDISCOVERED

Most of the bricks used in colonial buildings were made in the Colony, usually in the immediate vicinity of the buildings. The art of making the glazed end bricks which were then often employed for decorative

effect had been lost. Efforts were made without result to discover in England, Germany, the Netherlands and elsewhere the technique of this lost art.

Finally experiments by primitive methods were made in Williamsburg utilizing Williamsburg clay.

With a negro and a mule to work the mixing apparatus and by experiments with different kinds of wood burned in the improvised kiln under tested temperatures the process of making the glazed end bricks was rediscovered.

The wavy glass characteristic of colonial windows was obtained after various glass makers in America and abroad had studied this problem.

The paint upon and within the colonial houses in Williamsburg and throughout Tidewater Virginia was scraped through successive coats and the vivid original paint colors most generally used in the early and succeeding years of the colonial period were found and recorded. Similar methods were pursued in the study of woods, iron work, stone and tile of the early Williamsburg buildings. Existing fire ordinances prohibited wood shingles, so a fireproof shingle was developed after extensive experiment which simulates a cypress shingle.

RESEARCH DISPROVES SOME CHERISHED TALFS

To the Restoration's department of research truth is so dear that it often has to be purchased at the price of romance.

Should anyone venture to write of the tramontane expedition of Governor Spotswood and his Knights of the Golden Horse shoe, the research department would be immediately on the alert to see that the golden horseshoes were worn by the Knights as mementos and not by the horses.

Counting the traditional nights spent by Washington in homes scattered far and wide, the department checks to see if there were that many nights on the calendar or if there were any nights left for him to spend at home as history records he sometimes did.

Research takes much joy out of life by curbing the careless quoting of cherished traditions as if they were the proved facts of history. Consequently one is no longer permitted to say that the College of William and Mary helped support the infant Harvard College and helped to Christianize the people of New England with 45 pounds

sterling annually sent by the Virginia college to New England for each of those two objectives.

Investigations reveal that this money was sent for these purposes by the executors of Sir Robert Boyle who acting under the discretion accorded them in the will of this distinguished scientist gave the income of the purchased Brafferton estate in York-shire, England to the College of William and Mary to build and maintain the colonial Indian School (page 403).

This income was made subject to an annuity for Harvard and for the conversion of the New England heathen. Thus the annuity was paid directly and was not graciously given by William and Mary, which College doubtless otherwise would gladly have spent all it got on itself.

The research department feels that the restoration of colonial Williamsburg is in itself so romantic and so beautiful that it does not need fictional enchantment.

ADVENTURES IN COLONIAL ARCHAEOLOGY

The archeological research work of the Restoration contributed to the solution of many architectural problems. Where colonial houses shown on the Frenchman's map had vanished, excavations were made and foundations unearthed were measured and photographed. Thus the exact size and outline of buildings and the location of chimneys, partition walls and other items of interest were revealed. The size and shape of the bricks used were determined as well as the moldings upon stone steps.

Excavations made to unearth the Palace foundations revealed the ancient flagstone floors in the basement in perfect condition, also supporting arches, parts of the old walls, spacious wine cellars, sections of the marble mantels and pictured tiles. A complete photographic record was kept of all excavations made and of the structural progress of all buildings.

JEFFERSON WOULD HAVE REVELED IN STRUCTURAL WORK

More than forty tons of such material evidences were secured from these excavations. Samples of these materials have been carefully assembled in the colonial Court house of 1770 which is now the archeological museum of the Restoration. It serves as an exhibit of the domestic civilization of the 17th and 18th centuries. This building

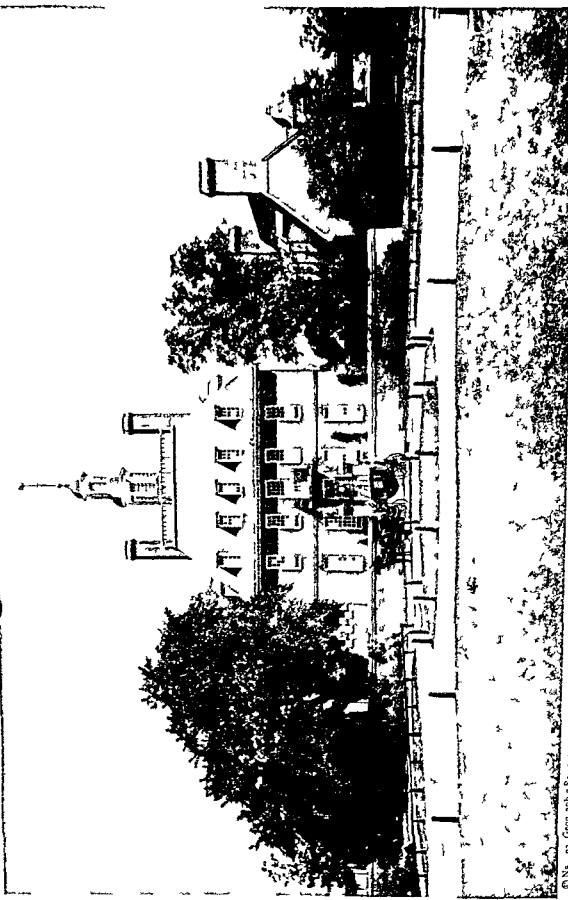


© National Geographic Society

Finlay Photograph by Willard R. Culver

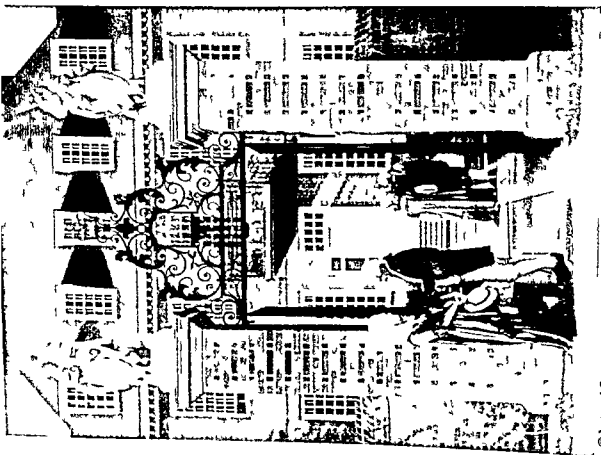
FORMAL GARDENS OF THE PALACE ARE A STUDY IN SYMMETRY

Looking north from the top of the restored Palace of the Governor the visitor sees these geometrically trimmed hedges and shrubs all exactly as old documents of colonial days describe them. The pansy garden glows to the right of the long arbor and the brick wall on its left encloses a burial place of Revolutionary soldiers. The pyramid or mount in the background is the icehouse.



© Na na Geog aphe So ey

50 LAVISH WAS THE GOVERNOR'S HOUSE THAT IT WAS CALLED THE PALACE
 Because of financial disagreement between the Crown and the Colony construction of the building was delayed but when it was completed it became
 the show place of Philadelphia. The present edifice has been reared on the original foundations according to the plans and specifications of
 the original architects.



© National Geographic Society

English Photograph by Lu's Marden

THE LION AND THE UNICORN FLANK THE GATE

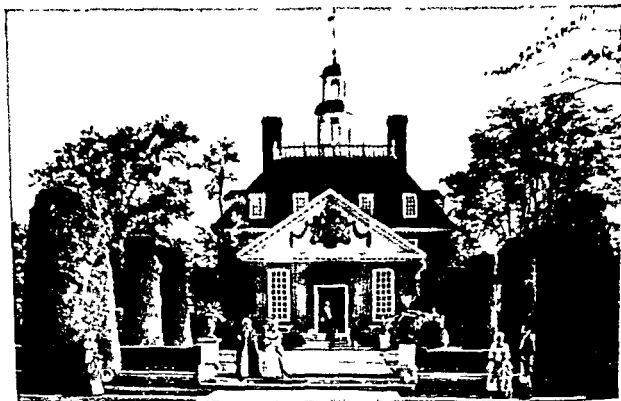
The British crown surmounts the grilled portal of the Palace and below it appears the cipher G R the symbol of George I in whose reign the building was completed



D. Taylor Photograph by Ed v n L. W. Sherr

A PORTRAIT OF JAMES I LOOKS DOWN ON A CHECKMATE

Collectors of furniture for the rebuilt Palace followed the inventories of governors who died in office This pre crust table belonged to Chief Justice Marshall



Finlay Photograph by William L. Culver

TWELVE MOSTLY OF TRIMMED RED CEDAR GRACE THE BALLROOM GARDEN
Faithful reproductions of English lawn decorations in the colonial period are these trees, hedges, and shrubs before the north wing of the restored Palace



© National Geographic Society

Dufaycolor Photograph by Edwin L. Wisner

ABOVE THE BALLROOM DOOR GLEAMS THE HANOVER COAT OF ARMS

The original cupola surmounting the main part of the Palace housed a "great lantern" which was lighted on the King's birthday and on other occasions of public rejoicing



Dufayco or Photography by Edw n L. W. sherd

BOX TREES TWO CENTURIES OLD SURROUND THE BOWLING GREEN

Williamsburg had such a public sward for the game of bowls but it was near the playhouse not on the Palace grounds where the restoration has placed this one

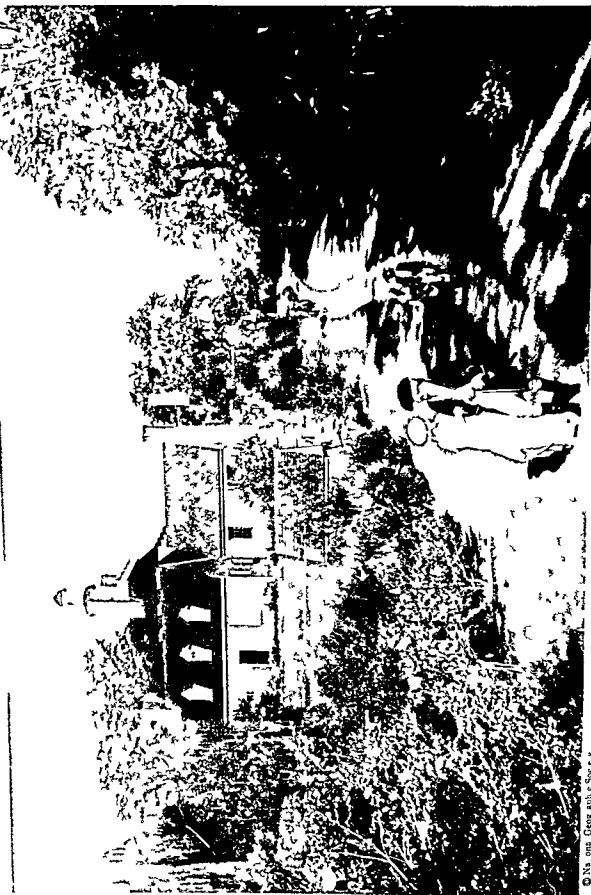


© National Geographic Society

Enslay Photography by W. J. d. R. Culver

MAMMY EXPLAINS TO VISITORS THE USE OF COOKING UTENSILS

Garbed in colonial attire she tells about the toddy iron on the chest (left) the pothooks spit coffee roaster flesh forks ladles and the rest of the historically correct equipment of the Palace kitchen

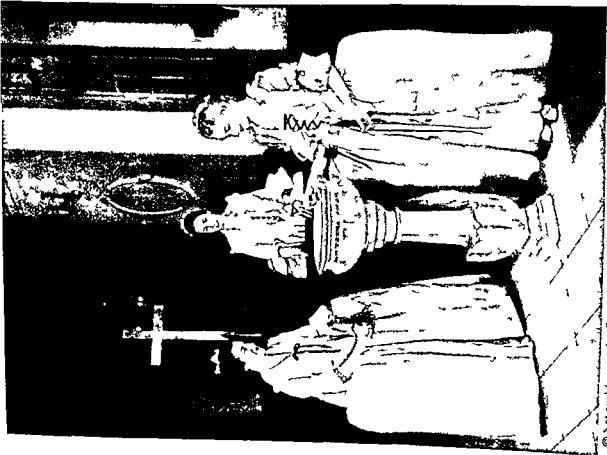


©Na onn Gong sph e Spe e y

SCOTLAND 14TH WAS ORIGINALLY A 1 ROAD STREET OF WILLIAMSHIRE

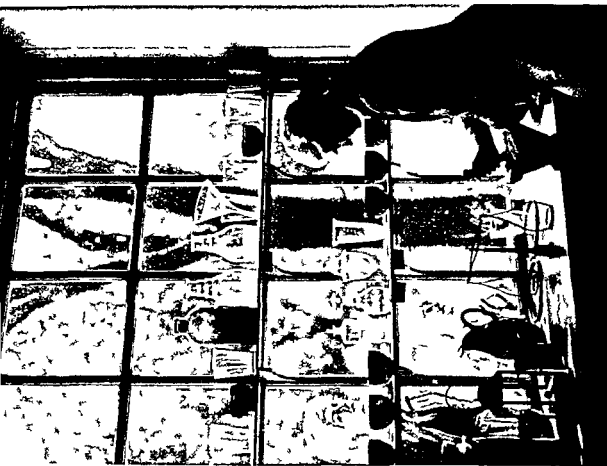
1 colo al t nes t was t ree poles (60 feet) w de and let past the Governor s Palace. Crovling can ell y the erect n of the v s cl onl near by ecc ta el clos g t to tra c and making of t t l s w nd b l r l fro c strolle s v e v l c get ble larde s l k of the l a lnce k t e l

En ay l ho cograph by l d w n L. W sh rd



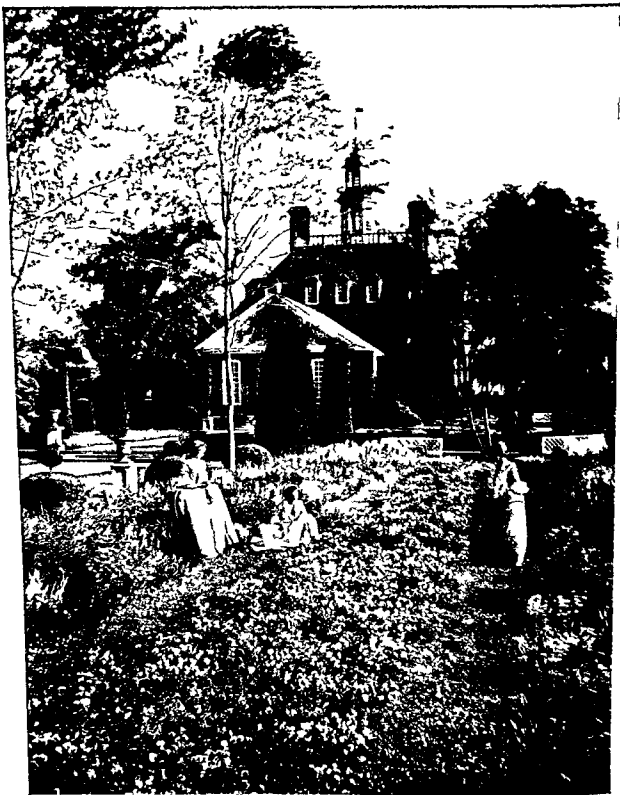
© National Geographic Society Dufaycolor Photograph by Edwin L. W. Sherd
TOLK OF OLD JAVELSTOWN WERE BAPTIZED AT THIS FONT

Buxton Parish Church treasures both it and the Communion service brought to Williamsburg when the first settlement's house of worship was abandoned. The building was restored through the efforts of its rector Dr. W. A. R. Goodwin (Plate VII)



DR. BLAIR USED SUCH MORTARS, PESTLES, SCALES, AND PHIALS
T. May Photograph by Lu's Marden

Colonial Williamsburg maids were doubtless attracted to the shop window to see the town apothecary prepare as advertised all sorts of balsams, decoctions, electuaries, elixirs, emplasters, infusions, liquors, magisteries, oils, and ointments.



© National Geographic Society

Dufaycolor Photograph by Edw n L. W. herd

FROM THE PALACE PANSY BED COLONIAL DAMES PLUCKED NOSEGAYS

Garden week in Williamsburg attracts thousands of visitors who admire the blossoms with the background of boxwood hedges intersected by marble and shell walks. Trees, shrubbery and flowering plants have been chosen by the restoration in accordance with careful research. Some housewives' descendants of the original homeowners complain today that it is not orthodox to grow even up-to-date vegetables!

also is designated is the information bureau of the Restoration (page 412)

The early structural period of the restoration would have been of absorbing interest to Jefferson could he have then revisited the city. His versatile mind would have found delight in the scope and methods of the work. Ditches in some places 18 feet deep were being dug by steam shovels for new water mains and sewerage pipes. Trenches were being made to conceal telegraph and telephone wires.

Concrete streets and sidewalks were then giving place to gravel roads and to brick and flagstone sidewalks.

In those early days of the restoration one never knew when he went to bed whose house he might meet in the morning moving down the street. Sometimes it proved to be a colonial house on its way in to fill a vacant space but more often it was a modern home exiled from the restoration area.

Many visitors having heard that the colonial city was to be restored assumed that within twelve months it would surely be finished. They began to arrive. No suitable place had yet been provided for their accommodation. They found the streets blocked off. They met the houses which were moving out as they moved in. They ran their cars into rain soaked ditches recently filled in or got lost in detouring in efforts to get somewhere and see things not yet existent.

Language was heard that desecrated the serene and temperate air which in colonial days was said to have constituted a great advantage of this place.

459 BUILDINGS DEMOLISHED

The restoration project has now been in progress for more than nine years. During this time it is officially stated that in addition to the three colonial buildings at the College 67 buildings have been restored. Ninety one colonial buildings have been reconstructed. 18 modern buildings have been moved from the restoration area and set up elsewhere and 459 modern buildings have been demolished.

This procedure was made necessary to get rid of the corrugated iron buildings and other incongruous structures by which the colonial city had been modernized and spoiled. Two blocks of new business buildings of a colonial style of architecture containing 13 shops a bank and a post office

have been erected adjoining the restored area.

Not including the labor spent in manufacturing and transporting material nearly five million man hours of labor have gone into the restoration endeavor.

In carrying forward the work it has been necessary to have important dealings with the National Government with the Governor of Virginia the State Legislature and with various departments of the State Government. Contract agreements had to be entered into with the governmental authorities of the city of Williamsburg and the County of James City, and also with various State and local institutions and public utility and public service corporations as well as with various State and local associations. In every instance a splendid spirit of co-operation was manifested.

THE FIRST TREES AND FLOWERS OF VIRGINIA

Restoration of the gardens also called for extensive research work. Because of the ravages of war and consequent poverty and neglect the form and outline of most of the colonial gardens had vanished. More than one hundred colonial gardens of note in Virginia were visited measured and photographed and extensive research was done in the contemporaneous gardens of England. From old maps and photographs and by archeological investigation old paths in many instances were located revealing the form and dimensions of the original gardens.

The ancestry of every tree flower and shrub supposed to have lived in colonial Williamsburg was investigated and only those of proved pedigree have been transplanted or allowed to survive. If in the course of evolution flowers shrubs and trees should develop into conscious pride of ancestry then they will surely convene in Williamsburg and elect Arthur A. Shurcliff landscape architect patron saint of their colonial genealogical society.

The spaciousness and variety of the revived gardens give to the buildings restored an environment of charm and quiet loveliness. This is especially true of the formal and terraced Palace gardens (Plate IX.)

The inflexible rule of the Restoration prohibited moving any boxwood houses or building materials from any except deserted places it being felt that no justification could exist for despoiling other homes to restore colonial Williamsburg.



THUS THE DUKE OF GLOUCESTER STREET LOOKED TEN YEARS AGO, BEFORE THE RESTORATION

The two stories in the left foreground were on the site of the Raleigh Tavern now one of the most interesting of the reconstructed colonial buildings (Plates II and III and page 413). These two structures and 437 others were demolished '91 reconstructed and 18 moved bodily from the restoration area to more suitable sites. Instead of the concrete paving asphalt put down in such a way as to resemble a gravel surface covers the road. The monument just visible beyond the telephone pole marks the site of the elaborate colonial Capitol stands today (Plates I, IV and V). As for many modern ugliness has given way to the quiet grace of early days. Telephone an

The restoration is now near completion. The early appearance of newness is wearing away. Vines have climbed over the fences and walls, flowers and shrubs have taken root in the gardens.

Two liveried coaches doubtless the forerunners of many other horse drawn vehicles yet to come carry the costumed hostesses to the exhibition buildings and in the late afternoon carry them home. These hostesses have received intensive training and are well qualified to interpret the restoration to visitors.

GUIDES IN PERIOD COSTUMES

Recently a guide service has been organized for those who do not prefer to find their own way through the restoration area.

Costumed men show the restored Public Gaol to visitors and other men in costume may be seen working in the gardens or serving in buildings while two old negro women in fitting costume preside over the Palace kitchen with a courtesy they learned from those whom they affectionately recall as *ole Missus*.

There already is evidence of the far reaching effect of the restoration. The establishment of the Colonial National Historical Park was due in no small measure to the work already undertaken by Mr. Rockefeller in Williamsburg. It was exhibit number one when Dr. Ray Lyman Wilbur, former Secretary of the Interior, Mr. Horace M. Albright, then Director of the National Park Service, and Mr. Louis C. Cramton, who later introduced the Bill to create this park, came to evaluate the suggested idea.

The Restoration also contributed to the passage by Congress of the Historic Sites Bill. Its influence on home builders and their architects far and wide is evidenced by constant inquiries. In these and many other ways it is helping to make America more conscious of the strength and beauty of its past.

The management of the Restoration is under the control of two corporations. Williamsburg Restoration Incorporated has charge of the construction and maintenance and general financial management of the work, while the care and direction of the exhibition buildings and of the re-

search and educational departments are under the control and direction of Colonial Williamsburg Incorporated.

A new air conditioned hotel of early Republic architectural design, situated just outside the restoration area, is to be opened in the early spring of 1937. Its southern outlook is upon the fields and forests which border upon the city restored.

As a part of the interpretative and educational program plans are being perfected to introduce handicrafts. Craftsmen will make reproductions in many of the colonial arts and trades working in restored or reconstructed buildings.

Arrangements are also being perfected for making authentic reproductions of the antique furniture of the exhibition buildings and for making available the colonial print colors which have been reproduced in the buildings.

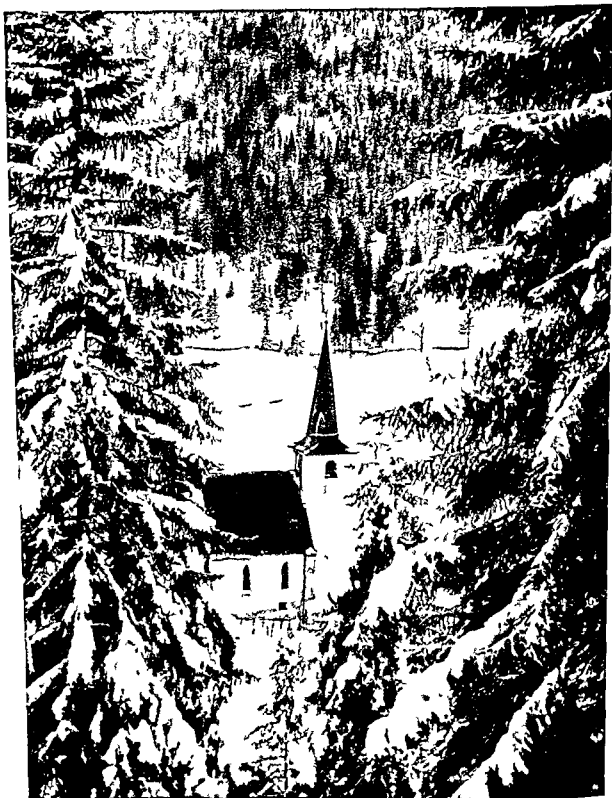
Any profit which may result to the Restoration from these undertakings and from other sources of revenue will be devoted exclusively to the maintenance of the Restoration and to its educational program.

The Restoration is a gracious and beneficent gift of great cost (it has been reported that more than \$14,000,000 have been spent upon the undertaking) and it is dedicated to the spiritual enrichment of human life.

The American Institute of Architects recently held its annual meeting in Williamsburg. Days were spent by those present who numbered nearly 600 in viewing and critically studying the work accomplished. They passed resolutions of enthusiastic endorsement.

Similar resolutions were passed by the advisory architects of the restoration and by a group of noted professors of American colonial history and thousands of others who have visited and viewed the results accomplished. Have individually expressed their delight and also their deep gratitude to Mr. Rockefeller for what he has re-created.

Among the many benefactions of Mr. Rockefeller and his father none perhaps will prove more lasting, illuminating and inspiring than what he has done through the restoration of colonial Williamsburg to wed truth and beauty here to be the interpreters of the past to the present and the future.



Photograph by C. von Coll

LIKE ANOTHER SPRUCE TREE IS THIS CHURCH STEEPLE IN A SNOWY FOREST

In Austria the author found that vast strides had been made in reforestation. In the valleys and on the hillsides she observed the dark rich green of spruce and fir, the tender green of the larch, and the long unbroken ranks of pine which stretch for miles and miles. Even the smallest community maintains a church which plays a leading part in village life. Almost every farmhouse has its own stone chapel with a blue and white Madonna and rows of high backed benches where passing travelers may join the family at worship.

THE SALZKAMMERGUT, A PLAYGROUND OF AUSTRIA

By FLORENCE POLK HOLDING

"GRUSS Gott said a little girl in gingham dress and diminutive white apron as I stepped off the express train at Salzburg on my way to Mondsee

What does that mean? I asked my companion

It means, he said, 'God bless you or God be with you and you will hear that salutation every day and many times a day. But you will never tire of hearing it. And he was right.

I had come direct from Paris on the Oriental Express and this was transition with a vengeance. Lakes and mountains, pure air, friendly people, gingham dresses and bright aprons, leather breeches, Tyrolean hats with green bands and eagle feathers and a sprig of edelweiss.

Through Germany I had watched with eager interest the rolling country, the rich dark forests, the curious stacks of grain which dotted the fields and which looked like a procession of hooded monks (page 475). I had noted the countless mounds of turf piled high for fuel beside the well-kept farm buildings.

In their neatness and compactness the German towns seemed to have stepped out of a Maxfield Parrish canvas. When I looked at the modern factories and rows upon rows of homes for workers, I could easily believe that I was back in the New World.

Just as I was becoming accustomed to all this industrialization the train had approached the Austrian border and in the blink of an eye I had been projected back into another age.

AN OLD WORLD FORTRESS FROWNS

Suddenly I caught a glimpse of that once impregnable fortress the Hohensalzburg which rests so securely on its granite heights and looks so defiantly down upon the city of churches at its feet (page 450).

You never forget that first glimpse of Salzburg. It is like a mirage. The whole thing bursts upon you so surprisingly that even the mountains seem not quite real. And repeated visits only intensify that first impression of unreality and evoke again that unrestrained astonishment. I was to come to Salzburg many times, but never

with a greater feeling of reverent joy than on this first bright morning.

Gruss Gott, I called back to the little girl in the gingham dress—rather timidly, for I had had some experience with Continental children before—and all at once it seemed that I really had been blessed.

In a few moments my bags had been transferred from the main depot to the little station across the street and I was on my way to Mondsee, in the heart of the Salzkammergut (map page 446).

HERE EVERYBODY SPEAKS TO YOU

As soon as the traveler leaves the suburbs of Salzburg, he notices two things: first that everybody speaks to him, second that everybody is wearing the distinctive costume of the district. A veritable rain of Gruss Gotts descends upon him and he is suddenly very self-conscious about his own attire.

I had another surprise when, after having ridden some distance on the Bad Ischl train, we got off and were instantly precipitated into the open country.

I knew that the former German Crown Prince spends a month almost every summer in Mondsee. There Napoleon once paid a visit of several weeks and there the former Austro-American Conservatory of Music had its headquarters. But as I looked around I was sure we had failed to make ourselves clear to the train conductor and that the whole thing was after all a mistake.

My companion who had been there before reassured me. A gasoline train of one car turned the corner from nowhere and before I realized it we were making our way into what has often been called the Switzerland of Austria (page 451).

This is not a true comparison because the sharp contrasts of the Swiss Alps are lacking. Nature here seems more inviting. All the peaks of the Salzkammergut including the majestic Dachstein glaciers visible from almost every corner are softer in outline and free from the awesomeness which sometimes overpowers a person in the presence of the higher ranges.

Even the shaggy crags of the Schaf Berg, the mountain which stands in the midst of some 27 shimmering lakes of blue-green water, are benign and friendly.



Drawn by Newman Bumstead

LAKES AND PEAKS DOT THE SALZKAMMERGUT

Festival loving Salzburg chief city of this Austrian playground is about 150 miles west of Vienna and close to the German frontier Emperor Franz Josef was long a leading summer resident of Bad Ischl

The Salzammergut is a paradise of mountains and lakes—mountains that are not inaccessible to the average climber and lakes that are not only delightful for sailing but warm enough for bathing. This refuge from the cares of the world is more and more attracting those who would escape a too rapid pace and do as they please for a while.

Here in the Salzammergut you will find Jeritza and Lotte Lehmann, fresh from their winter triumphs. Here in summer come many of the great conductors, such as Toscanini, Bruno Walter, Eugene Ormandy, and Rodzinski.

Here come young composers, seeking a haven after the adulation of the capitals of Europe. Here are the Duncan dancers, and many writers, painters, lecturers. And here are a large number of average American citizens like myself, to say nothing of thousands of Germans who are not deterred by the magnificent posters in their railway stations begging them to see their own country first.

One thing did deter them while it lasted. It was the fine of one thousand marks (\$250 at the time) imposed by the German

Government upon every German citizen crossing the Austrian border. How that punished the Salzammergut! I can still see, only too well, the deserted beaches, the empty inns, the shut up cottages, the long faces of the natives, in 1933, as they waited all summer for the trade that did not come.

Standing beside the lake at Mondsee that first morning, I was reminded of Lake Louise in the Canadian Rockies. The water was the same jade green. In the middle distance glistened the snowy fields of the Dachstein, distinctly suggestive of the Victoria Glacier, in British Columbia. When I looked at the swiftly rising hills that ran back from the eastern shore like a well brushed pompadour, I thought of St. Moritz.

As we turned into the broad, cool avenue called the Lindenallee we found it alive with people—week end guests, summer residents, youngsters on their way to the mountains. For it was Sunday, and, as the German says, "Sonn tag ist der Lieblingstag" (Sunday is the favorite day). Hordes of people were passing through to other places, on foot, on bicycles, in cars.

My companion was telling me the history of the region.

This, you know, is very old country. See that huge boulder over there? It was left right in that place and position during the last glacial period."

I was more impressed, however, by the smaller stones, certainly not left by a glacier, which were piercing my Philadelphia made shoes.

SALZKAMMERGUT MEANS "SALT CROWN LAND"

"The Romans knew this country well," he went on, "and worked the ancient salt mines that give the Salzammergut its name. The literal translation is 'Salt Crown Land.' There are many traces of the Roman occupation."



Photograph by Maximilian Kersch

THROUGH AN ARCH VISITORS TO THE CASTLE SUDDENLY SPY THEIR LOFTY GOAL

Strolling up the hill past the arcaded Cemetery of St. Peter (right) travelers may climb aloft to Hohensalzburg. Some prefer the modern funicular railway that replaces a horse-drawn cable car constructed in 1504. With its dungeons and torture chambers, the archbishops' old stronghold provides a gloomy contrast to the festival of Salzburg below (page 450).

Castle Mondsee in which you are going to live was once a flourishing Benedictine monastery with a huge church attached to it. It was established in 748.

748. I thought back. Why that was only six years after Charlemagne, who later ruled this country, was born.

I said aloud: Just as it stands today?

No indeed! The monastery suffered several major disasters through fire and pillage as did the whole of the Salzkammergut. Wars and conflicts laid waste the country over a period of a thousand years. Hordes

of barbarians overran the valleys while the powerful prince-bishops sallied forth from their strongholds to fight their equally powerful neighbors terrorizing the country all about.

I looked around me. It was hard to believe. The pastoral beauty of the landscape, the serene peace everywhere, the quiet musical voices of the people excluded all thoughts of war and bloodshed.

But the Salzkammergut, he continued, emerged triumphant from all this devastation.



Photograph by Josef Ziegler

DAVID AND GOLIATH OFTEN PARADE IN SALZBURG TOWNS

Afterward they re-enact the Bible story of the fight. The youth ruddy and of a fair countenance—put his hand in his bag and took thence a stone and slang it and smote the Philistine—and he fell upon his face to the earth. (I Samuel 17)

Restoration repaired her towns and villages and restored the ancient buildings while keeping their medieval charm and character. After a thousand years the monastery was dissolved.

About this time Napoleon hit upon the idea of making this a short cut to Russia. He engaged the services of a Bavarian Prince Wrede to conduct the French troops through the Salzkammergut, in return for which the Prince was made a field marshal and given the abandoned monastery as a residence.

Later Napoleon paid a visit of several

weeks here and the present state bedroom was furnished for him according to his own instructions. Your host, Graf Almeida, is the great grandson of that same Prince Wrede. And, as a special privilege you have been assigned to the state bedroom and will have Napoleon's bed.

Was I dreaming? But no, we had just emerged from the shaded avenue of lindens into the treeless glare of the market place and there before me stood the great square castle with the huge baroque church beside it.

Guten Tag (Good day), said each genial innkeeper as we passed, one after another, the quaint two-story houses gaily painted in delicate shades of pink, buff, and green.

'Guten Morgen' (Good morning) resounded from every side, a greeting abbreviated by the old men to a rather doleful Morg, or Morg'n.

ONE MAN SIDEWALKS NARROW STREETS

We were walking in the middle of the street, for the sidewalks in most of these towns are not wide enough for two. They reminded me of old streets in Paris where he who is on the outside has to navigate with one foot below the curb. The streets in Mondsee are so narrow that the wooden eaves of the houses look like friendly old gossips leaning out to glean the latest scandal.



Photograph by Franz Mayer

NO NATIVE SALZBURGERS ARE THESE STROLLERS WITH THEIR GERMAN SHEPHERD DOG

Their hats and gingham dresses are characteristic of the district, but the shoes betray the summer visitor. In general women of the Salzkammergut wear heavier footgear. This esplanade along the Salzach River is a favorite place for promenades. Towering like a castle in the clouds the 860-year old fortress of Hohensalzburg dominates the town.

I glanced at my very urban looking luggage, fresh from a New York shop. It was being jerked and jolted over the rough stones in a clumsy two wheel cart by a kindly old crone who had picked us up at the railway station. No taxis here!

It was incredible that only a few hours before I had been dining in Paris. Or that by retracing my steps I could, within an hour board a train for Vienna, Budapest, Sofia, Rome, Paris, or Berlin!

We made our way through the immense crowds to the Schloss or Castle. All about us groups of peasants in holiday garb greeted us cordially.

Wait a minute, said my friend. "Clear days like this and a crowd like this make a rare combination in the Salzkammergut."

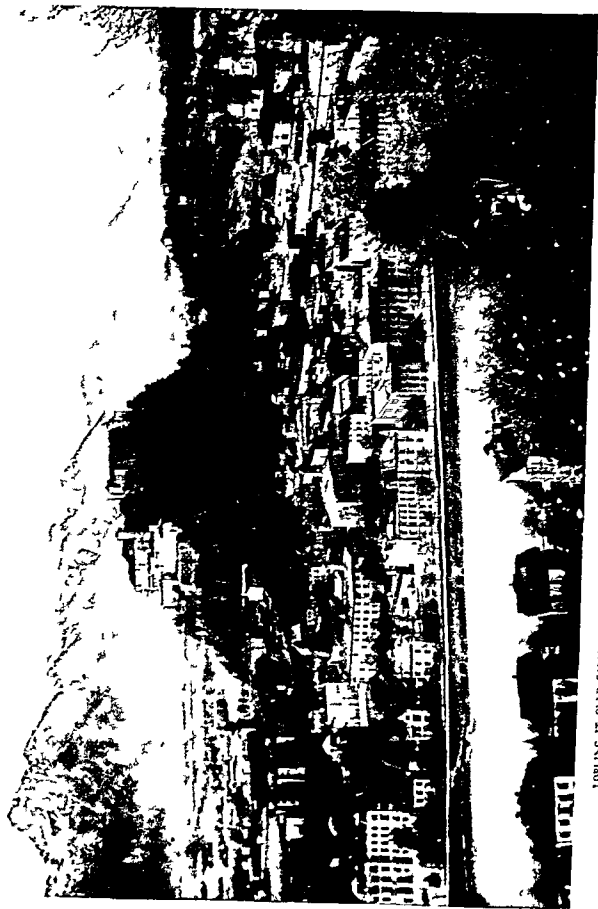
And with that he started his motion picture camera as I moved to and fro amid the friendly throng.

The bright color in dress, apron, scarf, braid, and hat made each group of people

look like an old fashioned garden of flowers.

I made hasty mental notes of the variety in costume. On Sundays and other religious holidays the unmarried girls wear chaplets of white wax flowers in their hair. The married peasant women wear the 'bridal crown,' a black, glazed linen affair bound tightly over the head with unbecoming streamers sticking out like elephants' ears (page 469). It puts a premium on the unmarried because of its sheer ugliness. And, indeed, in the two summers I spent here there were only two weddings.

The nine ladies of the town wear what is known as the 'gold hood of Linz' as attractive as the 'bridal crown' is unbecoming. We called them the "Brunhilde ladies" because their gold mesh head dresses resembled Brunhilde's and the old fashioned victoria which called for them on public occasions reminded us

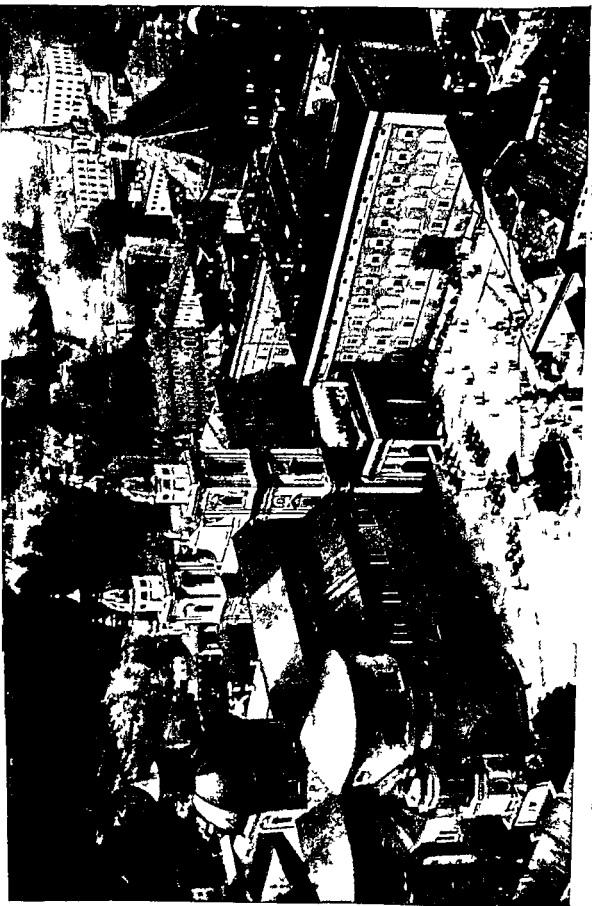


TORING IT OVER SALZBURG IS THE CITADTEL WHICH PRINCIPALS OF THE CHURCH RULID A RICHI DOMAIN
 Secu e in th lo t ew f il ben alit re arch b h is tell away le e f on 98 un il 1803 hen the Salzu g e l e can e pa t of A t la F l ing l n fr m al clers
 the Salzaeh Bl er cuts in tw the lo mer R man t a l ing fust w l o e l ewnt name com s f m local salt l i o s Beyon l hen l e snow cap l U l e s B g

l h g a h b y f n h C u



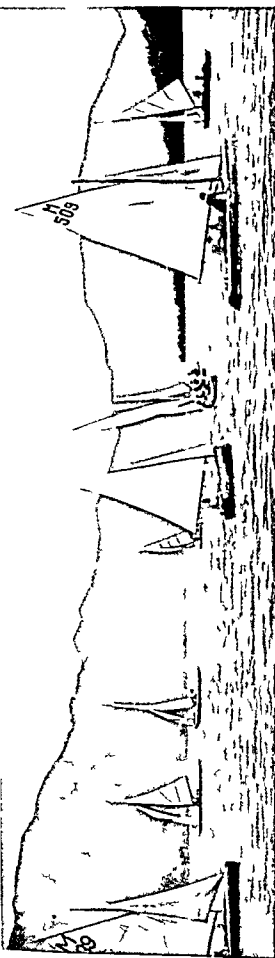
FROM THE AIR THE SALZKAMMERGUT SEEMS POCKED AS IF A GIANT HAD SCOOPED OUT VALLEYS AND SCATTERED THEM. VORLES
Hell Mountains (Hollen Gebirge) rise almost sheer above the Atter See in the background. Like pocket handkerchiefs drying in the sun, small farms cling to the
narrow shore of the Mond See (left center). The village of Mondsee, where the author visited, is at the opposite end of the lake.



WHERE MOZART PLAYED FOR ARCHBISHOPS SALZBURG'S FAMOUS MUSIC AND DRAMA FESTIVAL IS STAGED TODAY

Photo by Prince Ulrich Feind and K. Inky

Born here in 1756, the boy composer often took part in court concerts in the palatial Residenz (right), one time home of the city's ecclesiastical rulers. S. monotonous and unpleasing was his life as the archbishops' musician, and the creator of *The Magic Flute*. *Don Giovanni* and the *Jupiter Symphony* wrote I hate Salzburg and everybody in it. Spectators gather in the courtyard (center) before the cathedral's performance of *Everyman* (pages 466 and 473).



WINTER SPORTS GIVE WAY TO SUMMER REGATTAS AS YACHTSMEN RACE ON THE BLUF GRASS. WITH SIF, LARGEST ALSTRIAN LAKE



RACERS ON THE FROZEN TRUMPT SET KNOW WHAT FUN IT IS TO RID IN A ONE HORSE OPEN SLEIGH

110 Graph by Ru & H. Jobst



© Publishers Photo Service

COWS AND FAMILY GREET VISITORS COMING UP THE PATH

Hospitable farm wives treat callers to honeyed butter with bread and milk and ask them to sign the guest book (page 456). Roomy and comfortable is this Zell am See home with overhanging eaves, hand carved balconies and roof shingles held in place by heavy stones. More pretentious is the house with the tall weather vane farther up the hill.

of the chariot used in the Wagner opera (page 467).

Around their shoulders were draped lovely old Kashmir and Paisley shawls, handed down, like their golden hoods, from generation to generation.

The men are equally proud of the antiquity of their leather breeches which, with the curious suspender and embroidered leather belt, are passed on from father to son. Where our gentility gives up its family silver and oil paintings in bad times the Mondseer wistfully hands over to the antique dealer his leather belt and embroidered suspenders, or her golden hood and Kashmir shawl.

All adhere to the custom of wearing the local costume, men and women old and young, archduke and farmer, countess and kitchen maid. At Innsbruck, the capital of Tyrol Province, the initiated can tell at a glance from what district any native outsider has come. Whenever you see two but

tons at the back of a woman's waist and a bias band around the bottom of her gingham dress, you know she belongs to the Salzkammergut.

VISITORS WEAR NATIVE DRESS

The native costume is the summer resident's first purchase. You can't wait until you have the thing complete, with all accessories. It also simplifies your wardrobe. A change of apron is a transformation. The natives do not resent your usurping the traditional garb; in fact they are only too willing to help you (page 471).

'It matches,' says the friendly little shopkeeper in German as she runs with you to the door to see if the braid of your blouse harmonizes with the plaid of your dress. If it doesn't blend, she says with a slight frown of disapproval, 'It matches not,' and another choice has to be made.

Of course if you wish to be very swank,



Photograph by Ew ng Galloway

A "BEEHIVE" STOVE IS THE ALPINE CENTRAL HEATING PLANT

Logs are burned in it so effectively that a five minute blaze makes the glazed tile bumps too hot to touch. A farmer's family of Zell am See lives in the one large room decorated with colored panels, old china and pottery, and chamois and roebuck heads. Hay and grain may be stored in the adjoining room.

you march straight into one of the well known sport shops at Salzburg and order a costume outright. You can have a *Dirndkleid* (dress), blouse, apron, and Upper Austrian coat trimmed with braid and silver buttons made to order for ten dollars. At least you could two years ago.

Only don't be in a hurry for it. Their clientele grows by leaps and bounds, and, being Austrians, they can't bear to say

No. Sometimes you do not see your peasant costume again until you are ready to leave for America.

At the last minute, after having waited all summer, with your bags already on their way to Le Havre or Bremen, you storm into the shop white with rage, for it is now September!

"Where is the suit I ordered last June?" you demand in your most impatient manner. That suit about which I have written you every week, and which you promised to send me long ago?

"Oh, your suit." And the prettiest girl you ever saw goes to fetch it. She is gone a long time and comes back a little crestfallen. The coat, sleeveless and without a lining, is just as you left it at the second fitting.

"We're so sorry," she says, "but if you are in a great hurry, we could have it for you tomorrow."

"Tomorrow!" you cry. "I'm leaving for Paris in an hour!"

"Oh, in that case," she answers, "nothing daunted, we could send it to America after you."

You try to picture yourself walking down the main street at home in an Austrian costume. Or, rather, you couldn't have pictured it two years ago. But times have changed. A famous Salzburg shop now has a branch in New York just off Fifth Avenue, and no less a person than the proprietor himself goes back and forth several times a season with metropolitan orders for Austrian outfits.

And more and more one meets dresses suits hats and shoes which come closer and closer to those we coveted in Salzburg

My first night at Castle Mondsee was one to remember (page 475) The state bedroom was the largest bedroom I had ever seen How cramped Napoleon must have felt when he got back to narrow quarters at Fontainebleau!

There were 27 pieces of furniture, including three enormous inlaid mahogany wardrobes nine beautifully upholstered chairs two dressing tables chaise longue and prie dieu And much more But nothing was crowded

NAPOLEON'S BED TOO SHORT FOR THE GERMAN CROWN PRINCE

I tucked myself away in the bed that had once been used by an emperor I should say emperors for Franz Josef came here too This room was also occupied by the former German Crown Prince on his visits And wasn't he surprised to find that this time it had been given to an American!

Oh I don't care said the tall prince in fluent English I never liked Napoleon's bed, anyway It was always too short for me

I liked everything in my room except the *plumeau*

A *plumeau* is the Continental substitute for regular bedclothes It consists of a thick feather stuffed quilt, usually Burgundy colored so as not to show the soil around which the top sheet is buttoned It sits on the lower sheet like a pancake and cannot possibly be tucked in anywhere

If you are too warm and throw it off, you have thrown off everything If you are cold and instinctively draw it up to your shoulders your toes are sticking out in the chill air And your nights are spent in trying to keep it just where it belongs

But otherwise life is very simple in a town like Mondsee For the natives it centers around the church and the market place

The Church is active here—almost as busy as it was in the days of the monks There are five or six services a day, beginning at 4:30 in the morning The first time I heard the great bells tolling at this unearthly hour I thought the town was on fire

But there was only a scant scuffling of feet across the market place and no intimation of a disturbance So I just ducked under the *plumeau* to get away from the

deafening bells and waited Much later I learned that people were merely going to service

The peasants extremely devout, go to church religiously During the day they tend their farms and raise their crops working in the fields until twilight (page 468)

The farmhouses, partly stone, partly frame, are large and square with overhanging eaves and hand carved balconies Sometimes they are all white with rows and rows of bright colored window boxes full of gay flowers There is always an equally square and comfortably sized barn, either adjacent to or attached to the house The impression is that of cleanliness of good husbandry of moderate thrift and above all of peace and contentment (Color Plates III and VI and page 454)

If you stop at one of the farmhouses you will invariably be treated to *honeyed* (honeyed) butter with bread and milk You may be asked to write your name in an improvised guest book And you needn't be surprised if the farmer has seen something of the world himself, and has even been to New York

NEARLY EVERY FARM HAS ITS CHAPEL

Near the entrance to the farm you notice the tiny stone chapel which almost every farmstead boasts It is immaculate in a coat of white paint The blue and white Madonna and the cloth on the home made altar are spotless the flowers in the vases always fresh I never saw artificial flowers in an Austrian church

The slopes which run down from the hills to the road are crowned with rich luxuriant conifers Against the dark skyline of spruce and fir larch and pine bright patches of grain are laid out in narrow rectangular plots They fall away from the roots of the trees in precipitous descent tumbling into the road below like variegated strands of ribbon

How the peasants manage to plow, sow and reap these almost perpendicular inclines was a constant source of astonishment to me And yet three crops of hay are often reaped in a season

In the fields and at the crossroads stand covered crucifix shrines which remind you of the *calvaires* (calvaries) of Normandy Sometimes you come upon them in the forests or on the summit of a mountain They are an integral part of the landscape In the summer you will



© National Geographic Society

Autochrome Lumière by Hans H. Idenbrandt

TALES OF RICHARD THE LION HEART STILL ARE TOLD IN DURNSTEIN ON THE DANUBE

Mothers resting with their children by the fountain in the Abbey courtyard tell how the warrior King of England, homeward bound from the Crusades, was imprisoned in the craglike castle high above the town. Legend says he was found when the faithful troubadour Blondel, wandering through Europe in search of his King, sang a familiar song beneath the castle windows and Richard sang it back to him. These folk costumes, worn on special occasions, have been handed down like the story for generations. In an Austrian castle at Enzesfeld, some 43 miles from here, the Duke of Windsor stayed with friends.



Autocolor Plate by Hans Hildenbrand

A MARBLE MONUMENT RECALLS THE PLAGUE THAT STALKED THROUGH VIENNA IN 1679

Emperor Leopold I erected the Trinity Column on the Graben in gratitude for the city's deliverance and included his own likeness along with the Holy Trinity, angels, and billowing clouds. The Graben, meaning "moat," now a principal street, once marked Vienna's southwest boundary.

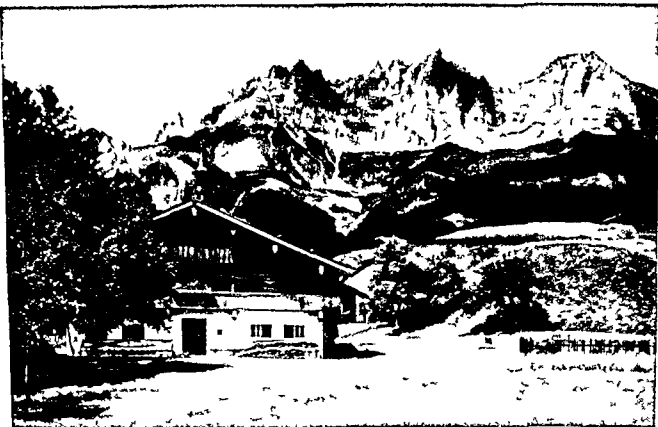


© National Geographic Society

Autochrome Lumière by Hans Hildenbrand

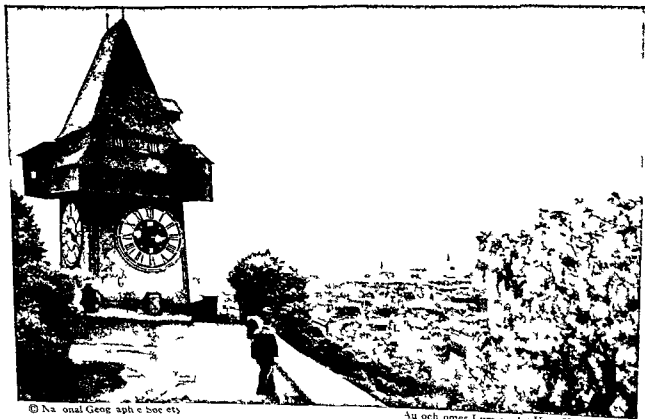
GAY, GOOD-HUMORED THEY TRYIFY VIENNA'S FAMED GEMUTLICHKEIT

The word is used as a toast or greeting to suggest good nature, kindness, or joviality. The neat kerchiefed proprietress of this fruit stand sells most of her wares by the quarter kilogram (about half a pound). What looks like "Ify" on the signs is really "Ify."



CATHEDRAL-LIKE MOUNTAINS OLD HOUSES IN QUILT VALLEYS—THIS IS THE TYROL

The might of Austria's former Hapsburg Kaisers is suggested by the rocky pinnacled Wilder Kaiser seen here from the town of Ellmau. It forms the southern range of the Kaiser Gebirge near the German boundary. Half stone half painted wood is the farmhouse topped by a cross and bell



© National Geographic Society

Author comes home by Hans H. H. H. H.

A SQUAT OLD TOWER WITH FOUR FACED CLOCK GAZES DOWN AT BUSY GRAZ
Below the Schlossberg or Castle Hill spreads Austria's second largest city capital of the rich
Province of Styria with its iron mines and mountain vacation land makes machinery bicycles wagons beer linen and leather goods
Graz straddling the River Mur

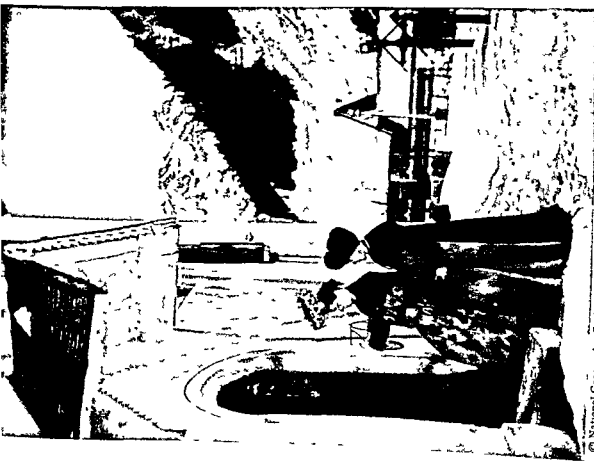


© National Geographic Society

WINTER COMES TO STUBEN IN VORARLBERG A LITTLE AUSTRIAN PROVINCE NEXT DOOR TO SWITZERLAND

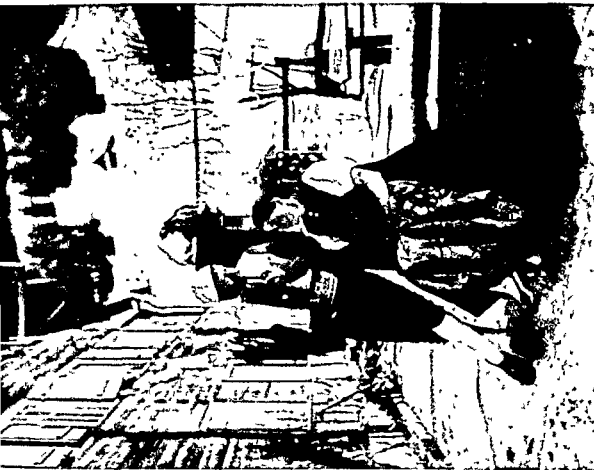
Visitors wing their feet with skis and slide down slopes as easy as that in the foreground or as dangerous as those that rise above the snowy roofs and the on-shape of the steeple of the church. Slanting up the mountain beyond the town is the road to the Adler, Piva beneath which runs the Paris-Lyon express in a 60° angle.

Autochrome Lumière by Hans Hildenbrand



© National Geographic Society

HERE COMES THE BRIDE, MITTELBERG STYLE
 Entering the church, she wears a top-heavy hat of artificial flowers. Women's garb varies from valley to valley, but characteristic of most is the large number of voluminous petticoats. To the right of the church door hangs the holy-water font.



Autochromes Lumière by Hans Hildenbrand

A BIT CHILLY FOR A TETTEL-TETTEL

Such a scene might have been pictured a century and more ago, except for the modern water faucet and high heels. This young married couple of Riezleren wear the time-honored folk costumes. He is proud of his gay belt, six inches wide, she of her brightly embroidered apron.



SHIRT-SLEEVED AND EVEN SHIRTLESS THEY GO SKIING

These mountaineers are more in danger from sunburn than freezing for the sun is warm on the clear, lofty heights of Vorarlberg. Beyond them, seen from the Ulmer Hutte, are the Fervall Group and the Riffler.



© National Geographic Society

Autocromes taken by Hans H. ten and

LOVERS OF WINTER SPORTS INVADE THE EASTERN TYROL TOWN OF KITZBUHEL

So many come from England and the United States that anyone depending upon ears alone might think it an Anglo-Saxon village. But typically Tyrolese is the paintless old house with its overhanging balcony and its bell which calls skiing parties home from the hills at mealtime.



Autochrome Lumiere by Hans H. Idenbrand

A QUIET TRYSTING PLACE IS THE OLD FOUNTAIN IN ST WOLFGANG

It stands beside the church and is topped by a silhouetted figure with bishop's crozier or staff. Bishop of Ratisbon and missionary to the Magyars Saint Wolfgang for whom this Upper Austrian town is named lived about 1100 years ago.

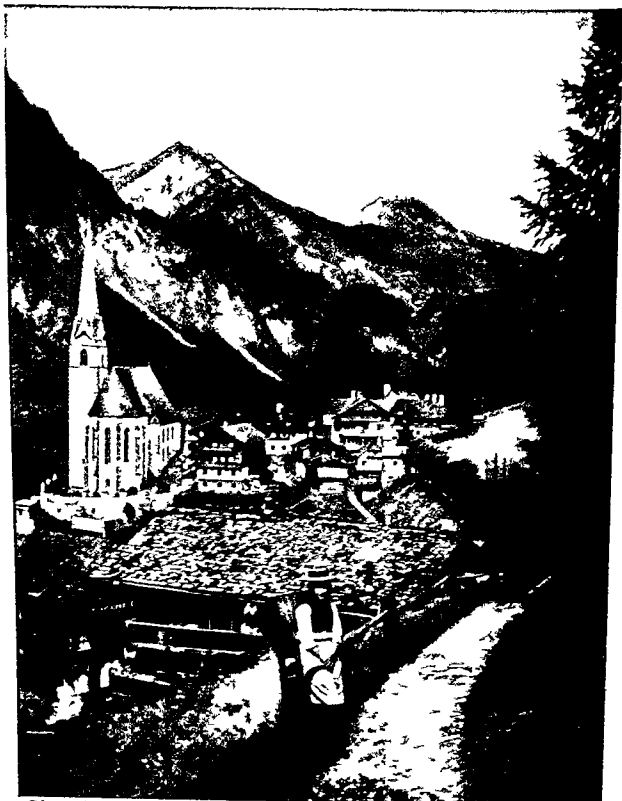


© National Geographic Society

Autochrome Lumiere by Wilhelm Tobien

TO THE STRAINS OF ZITHER AND HARP THEY DANCE THE TYROLESE CLOG

Son and daughter, father and mother, all wear versions of the national dress. With his footless socks and chamois leather shorts, this modern young man of Arzl is probably attired much the same as Josef Speckbacher when nearly 130 years ago he fought for Tyrolean independence.



© National Geographic Society

Anochrome Lum. by Hans H. von Brand

HEILIGENPLUTZ'S 15TH-CENTURY CHURCH JOINTS A SLENDER LATE-GOTHIC FINCH SKYWARD when it was saluted by a fanatic. Traditionally the blood was brought here in phials from Constance, a Dane. Though Heiligenplatz retains its Old World air it lies on a modern road which leads through the glacier regions near the Gross Glockner, Austria's highest mountain. In the view the peaks are hidden by low hanging clouds.

see standing in the fields of grain little sticks of evergreen and flowers—blessed at Easter—sentinels of faith, bleached and faded though they are

ROADSIDE PICTURES CALL OLD TRAGEDIES

More interesting to the stranger than the shrines are the Martyrs or memorials set up along the roadside, commemorating accidents and miracles of the neighborhood. They are usually colored pictures done in oil very crudely, framed in glass, and protected by a little wooden roof.

One depicts a small boy who has fallen through the ice. His companions struggle in vain to rescue him while haloed angels hover overhead waiting to bear his released soul to its heavenly reward—a simple story without need of text.

Another shows a horse prostrate beneath a heavy load of wood in the heart of the forest. On the faces of the peasants is painted overwhelming consternation. But lo from the skies comes the miraculous present of a fresh horse to take up the burden. There is no sacrilege here, and the passer by would like to believe that it happened so.

A memorial that I remember in detail and even copied because it was particularly naive and innocent pictures a blue robed Madonna serenely seated in the heavens looking down upon a dismal scene below. In the background are the mountains hemming in the waters of Mond See. In the foreground is an abandoned rowboat drifting drearily along the marshy edge while underneath is inscribed in German the following lugubrious narrative:

On the first day of March 1877 Johann Schweizhofer was returning with some friends by boat from Mondsee to Plomberg. Suddenly the hat of his friend J. Graf fell into the water. Johann leaning out to recover it was precipitated overboard and was drowned although he was a very good swimmer. Pray for his soul.

Another and well known instance of romantic sentiment about casualties of the past is the Kreuzstein in the Mond See (page 485).

A hundred years ago the story goes a bride and groom together with their parents pushed off from the shore in a small boat. When they had gone only a little way an enormous mass of granite from the overhanging Schaf Berg fell on them crushing them all to death. A cross was

erected on the huge rock which stands in the water just as it fell and scarcely a day goes by that some peasant does not bring a floral offering to the Kreuzstein.

The picturesque countryside has an added allure in the sheer profusion and beauty of its wild flowers—flowers which are almost invariably blue and lavender with a sprinkling of yellow.

Here are scented harebells as large as our cultivated Canterbury bells. The streets of the villages give upon fields studded with blossoms: the gentian, lupine, wild pea, spirea, and toadflax border the roadsides, myriads of forget-me-nots follow the furtive streams while the upland meadows abound in rare flora, the pursuit and delight of botanists.

The trains go slowly through the Salzkammergut so that the visitor may drink his fill of scenic beauty.

MOZART FOUND INSPIRATION HERE

This is the country in which the young Mozart grew up and if it is true that he found the city of Salzburg intolerable under the patronage of Archbishop Hieronymus who made his music director's life such a burden how he must have warmed to these lakes and crags and blossoming fields as a refuge and escape from his irritating lord! His music is filled with the impersonal beauty of the landscape itself and reflects everywhere its serenity and stately charm.

The townspeople in the Salzkammergut are busily occupied with shops and inns soliciting the trade of the summer residents with all the resources at their command. In the evenings they come out to the gaily covered tables set on the sidewalk and over their tankard of beer they laugh and chat with their neighbors until bedtime.

Every Saturday night in summer a motion picture is shown—a good one too, often an American or English film. The hall or *Kino* is minute. But the innate dignity of the Austrian invests it with all the formality of an up-to-date Parisian cinema. You choose your place outside from a chart and only in that place may you sit.

At the *Pause* or intermission refreshments are served including ice cream cake, candy and *Himbeer* an unfermented raspberry sirup. It is something more than just a movie.

On Sunday nights in midsummer an open air performance of the famous old



Photograph by Herta Hanslik

A ROOK IS WHITEBEARD'S CRONY

The old man greets passers-by with a doleful sounding "Morg'n" an abbreviated form of "Good morning" which seems to be the prerogative of elderly people. Birds, dogs, cats, even pigs are often members of a Tyrolean household.

in reality play, Jedermann (Everyman), is given by a local cast. In Mondsee the same players carry on year after year just as the Passion Players at Oberammergau do.

DEATH STEALS THROUGH THE TREES

Jedermann, also known as The Rich Man's Feast, depicts a sumptuous banquet given by a rich and worldly man to honor his mistress. Everything goes happily until the one grim guest, who came uninvited, appears. It is thrilling to see Death creeping up the stairs of the Salzburg Cathedral, all unnoticed by the merry makers. But it is equally realistic to watch him steal through the dark evergreens at Mondsee (pages 472 and 473).

At the sight of Death standing beside the rich man, all the guests flee in terror, even the three poor relations who fared badly straight through the feast. The rich man in despair finds that only Faith, Hope, and Charity are left to follow him to the grave.

Once a month Jedermann is performed by a group of youngsters who are being trained to take their elders' places. At high noon on Sundays two boys dressed as medieval heralds stand in the market place, and from bugles draped with the flag of Austria they play the traditional tunes which announce the forthcoming performance.

On pleasant week-day evenings certain ambitious and patriotic young men go down to the lake front and practice the *Schuhplatteln*, a slap dance popular in this part of Austria (page 482).

Every Tuesday night the members of the town band, looking very trim in their dark green uniforms, appear in the market place and regale the rest of the population which spends its time promenading over the hard stones with a series of Vienna marches.

The band at Mondsee had a great deal to do. No wedding or funeral could go on without it. In a procession of any kind it always had the place of distinction.

Having escorted a procession to the church door, the members of the band would then hie to a near-by taproom and refresh themselves until a messenger was sent to fetch them. Yet they never gave you the feeling that they were either intemperate or disrespectful. They were just natural human beings taking life as they found it.

Once a year there is a special day when



Photograph by Volker Mastalka

WINGED CAPS OF GOLD ARE THEIR MOST TREASURED HEIRLOOMS

Only well-to-do women own the gold hoods of Linz (page 449) made of silk and gold leaf. Brunhilde ladies, the author calls them, for some suggest the buxom, helmeted queen of the Wagnerian opera. The gleaming headdress, satin apron and colorful shawl leave the family treasure chest only on special occasions, such as religious feast days.

every shopkeeper moves his wares out side in the middle of the market place. There they seem to be more enticing judging by the crowds that surround them than they could possibly be inside the rather stuffy little shops.

In Mondsee, where local traditions and customs persist, weddings and funerals are equally interesting and strange to relate, equally somber. (Color Plate V)

Graf (Count) Almeida had very kindly put at the disposal of those of us who were guests at the Castle the private loge of the Wrede family. From a corridor of the Castle I could walk straight into the second floor of the church.

The loge was painted in cream and gold, with kneeling stools of red velvet plus a few finely upholstered chairs. It had five casement windows which gave on the church

and from this vantage point the occupants could see everything going on below.

On the other hand, by closing the windows they could be entirely cut off from the service—and there must have been times when this seemed immensely preferable. Under cover of attending Mass, lovers could whisper here without fear of intrusion. And no one knows what deep political plots were worked out in this regal box!

A BRIDE WEARS BLACK

The first thing I noticed about a wedding was that the peasant bride, for some unaccountable reason, discards her lovely, bright and extremely becoming native costume on her wedding day and substitutes for it an ill-fitting black alpaca coat and skirt.



Photograph by Kurt and Margot Lubinski

NOT EASILY STOPPED IS A LOADED HAY WAGON ON A STEEP ALPINE FARM

The grizzled Salzburger halt their sleek oxen on a tiny meadow that slopes down from a wooded peak. A double eight hour day is the rule here. The rigorous life makes the men look like patriarchs but probably neither is much more than 50 years old. This load of hay will help feed the oxen and dairy cattle during the long winter.

When the one hired vehicle rattles down the main street, bringing the prospective bride and groom to the inn where the procession forms, only the horse, whose tail is braided with roses, has the mark of festivity.

The procession is simple. A few little girls precede the bride. A single attendant walks beside her. The prospective groom walks solemnly with the priest. On entering the church the bridal couple go up into the chancel and take their places on a hard bench. They leave it only for the cere-

mony of the ring. There they sit for two hours or more without exchanging a glance, while the Mass is celebrated and a long discourse, filled with the most detailed admonitions, is read to them.

Once I noticed a bride take out her powder and puff—it seemed that Mondsee wasn't too naive for this vanity—and smother her tears during this ordeal. Yet I was told afterwards that she was proud and happy in spite of her tears.

When the wedding is over, the bride walks back to the inn, not with her hus-

band, but with her woman attendant. The bridegroom looking as serious as ever accompanies the priest.

Then in a stuffy upstairs room which they have hired at the inn, the couple are obliged to sit for twelve more hours while their friends and relatives dance, smoke, eat, and drink. All the time the room is getting more suffocating from the dust of stamping feet and the combined odors of tobacco smoke and perspiration.

THE TOLLING OF FUNERAL BELLS

A funeral of course is a most important and dignified event. On the day of a funeral the great bells are tolled by friends of the dead. If the person who has died is a child the bells are tolled by children. And so heavy and powerful are these bells that the children are lifted off their feet as they pull. But to ring the bells is considered a great privilege.

Then comes the procession—on foot. No riding through the streets in automobiles in this part of the world. The procession marches from the house to the church and again after Mass has been celebrated from the church to the *Friedhof* or garden of peace as the Germans so touchingly call a cemetery.

In this procession are first the Sisters of Charity then the priests, acolytes with crucifix and censers, various organizations, the band and the Brunhilde ladies in their gold hoods, the mayor and other officials of the town, the family and friends.



Photo graph of Florence Holding

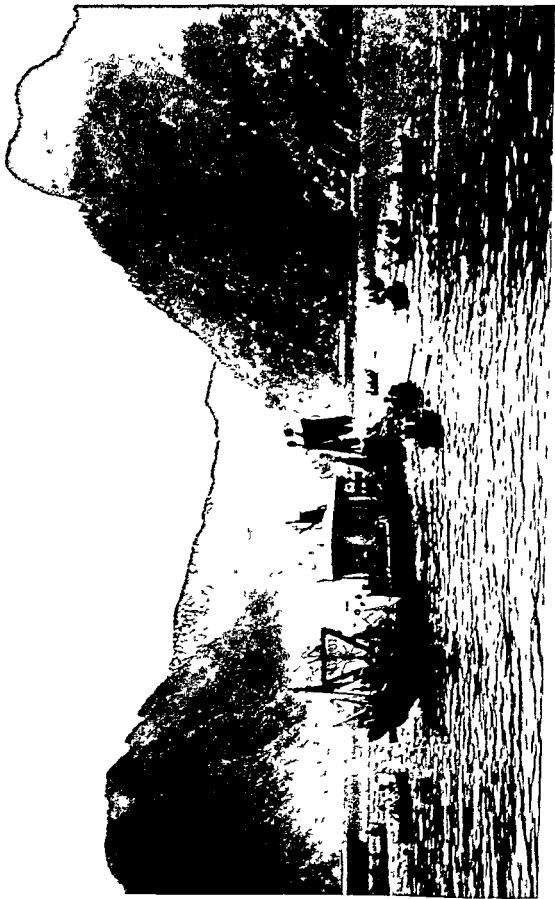
SOMBER MATRONS' DRESS MAY ACCOUNT FOR INFREQUENT WEDDINGS IN MONDSEE!

On Sundays and religious holidays farmers' wives don the black, glazed linen bridal crowns with folds hanging down each side like elephants' ears in contrast to the gay gowns and hats of young girls. The author heard of only two weddings in the two summers she visited here (p. 449).

Before the church service the floral gifts to the stricken family are set up on easels along the sidewalk in front of the house. He who passes may not only stop and look at the flowers and smell them, but he may also read all the messages of condolence if he wishes. In fact, he is expected to.

When it is time for the procession to leave the house, the floral pieces are gathered and set up a second time in front of the church.

The coffin is brought to the porch of the



Photographed by Heinrich Schunemann

WITH SONGS, RHYTHMIC CHANTS, VILLAGERS ROW THE HOLY SACRAMENT ON A FLAG DRAPED BARGE ACROSS THE TRAIL IN THE

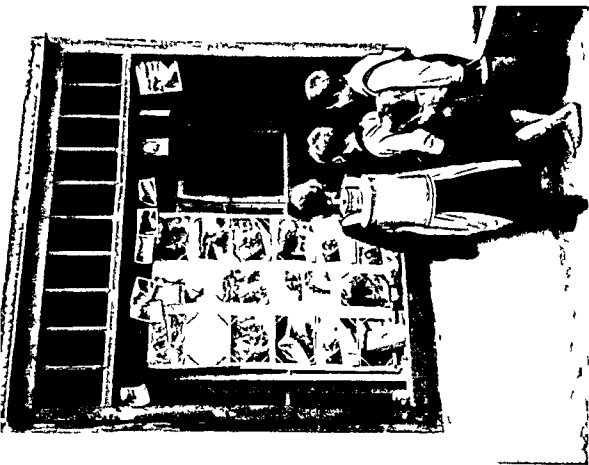
Country folk dressed in their Sunday best cluster in small boats around the colorful craft in a centuries old Corpus Christi procession. Pilgrims gazed the Jubilee on a dais fringed with gold, inside the tentlike pavilion. Sailing from the village of Traunkirchen, the worshippers cruise on the lake, then return disembark and march to the church singing. A similar procession is held annually at Hallstatt (page 464)



Photograph from Florence F. Holding

A MONSIEUR COSTUME BECOMES THE AUTHOR

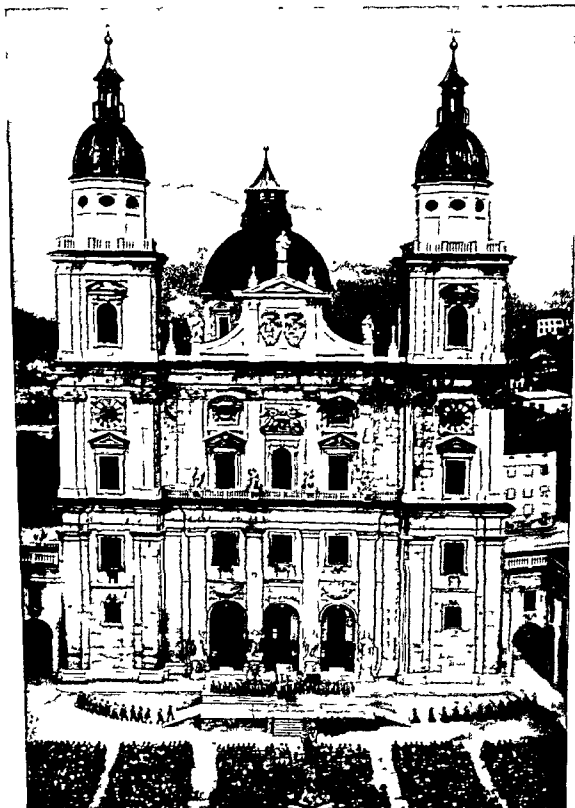
First purchase of most summer residents in the Salzammergut is a native out fit, a skirt of the local plaid and a linen jacket and apron trimmed with braid and silver buttons (page 454). Veiling the house with the overhanging roof is a pear or apple tree which is espaliered or trained on a trellis like a vine.



Photograph by Burton Holmes from Galloway

SO THIS IS WHAT BRINGS FOREIGNERS HERE!

Carrying cans of milk to sell in the town youngsters from the country gaze at photographs of familiar scenes that attract thousands of visitors every year to Heiligenblut (Holy Blood!). The third picture from the bottom (left) shows the 12,461 foot Gross Glockner Austria's highest peak (Color Plate VIII)



Photograph from Florence F. Hold on

FOR 'EVERYMAN,' THE MEDIEVAL DRAMA, SALZBURG CATHEDRAL AND MOUNTAIN PEAKS FORM A MIGHTY BACKDROP

The famous old morality play produced by Max Reinhardt is performed during the summer on a stage before the rose and white marble façade. Here dancers file in from both sides to entertain the guests at the rich man's feast (page 466). In the audience church dignitaries in red hats and cassocks occupy the front rows.



1 photograph by Ellinger

DEATH COMES TO THE RICH MAN'S FEAST IN THE JEDERMANN PLAY

Silently the grim visitor crept up the steps of the Cathedral to the stage unnoticed by the revelers at the banquet table. Feeling his presence the doomed host rises in terror. Guests are agape with fear. First to flee is the rich man's mistress seated at his right. Soon all forsake him except Faith, Hope and Charity who accompany him to the grave as Everyman ends.



Photograph by Kurt and Margot Lubinski

SNAILS, FOR EATING, BRING TWO CENTS A POUND

A Tyrolean farmer who gathered them in his vineyard, eviscerates the scales as a bagful of the tasty mollusks is weighed by a buyer from town. Stacked behind are the ventilated cases in which the shipment goes to market. In France snails are specially fattened for table use. After soaking for eight hours in a salt solution they are boiled for five minutes, removed from their shells, fried in butter and served with garlic sauce. Sometimes the snail meat is minced, then stuffed back into the shell.



Photograph from Florence P. Holding

TROPHIES OF THE HUNT BRISTLE IN THE MAIN HALL

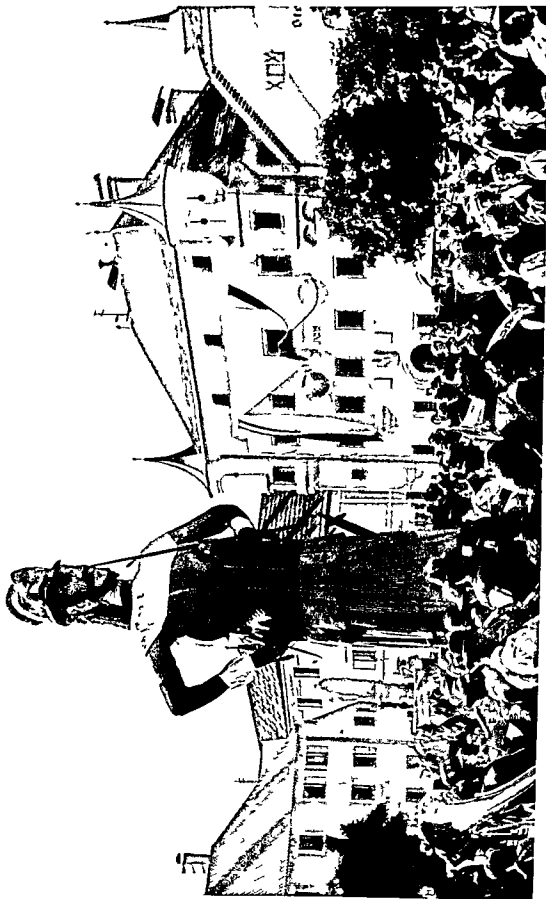
Napoleon Emperor Franz Josef, and the former Crown Prince of Germany have been guests at Count Almieda's castle at Mondsee once a Benedictine abbey. Under each pair of horns is inscribed the hunter's name and the date. During her visit the author was given the bedroom where Napoleon slept (page 448).



Photograph by Burton Holmes from Galloway

FATHER AND DAUGHTER STACK GRAIN ON POLES

A row of such piles in the background reminded the author of a procession of little monks trudging in single file across the field. Even the younger children work on the farm for all hands are needed to glean a living from the tiny patch of viable soil.



Photograph by Oswald Libl

RED HAIR'D SAMSON 25 FEET TALL, DAN-CTS BEFORE TAMSUFTS TOWN HALL ON CORPUS CHRISTI DAY

A husky citizen invisible beneath the giant's skirts carries on his shoulders the 140 pound figure with its silver helmet blue tunic and enormous sword escorted by a flaring band and two dwarfs in grotesque garb the statue is paraded annually through the village may we hom-age to local notables by pirouetting before their houses Instead of the Samson procession some communities of this region stage a fight between David and Goliath (page 448)



Photograph by Asa and Margaret Lubin

WAY

GIRLS SPIN SKIRTS AND PETTICOATS WHIRL AS DANCERS SWING IT IN THE TYROL

To the tune of zithers, horns and musical saws, agile youths and girls caper and pirouette on the stage of the town hall. As the tempo increases, they slap their thighs and boot soles, jump like acrobats and twist their bodies to the accompaniment of shrill whistles and yodels. Weddings and folk festivals are occasions for strenuous dancing among the fun-loving mountain people.



The photograph by Herta Hanslik

UP THE STEPS WITH A SWISH OF SKIRTS COME GIRLS TO MEET THEIR BEAUV

Eyes bashfull lowered but laughing merrily they hurry from church into the village square. The heavy silk dresses of gorgeous colors may have been their mothers' but the embroidered shawls are presents from the sweethearts. In summer many an Alpine girl lives alone for months in a mountain hut guarding the family herd in pastures just below the snow line.

church and there placed on trestles while inside in the chancel prayers are said censers are swung and holy water is sprinkled on a mere effigy of a coffin temporarily erected for the occasion

I have yet to learn the reason for Mondsee's departure from the time honored custom of bringing the body into the church

At the close of the service photographs of the one who has died printed on a neat black bordered card together with selected prayers and hymns, are passed out to the friends and relatives

At all services including weddings and funerals two collections are taken Two men with alms boxes move along the aisles one a little behind the other This is to my way

of thinking a psychological trick to catch the man with an easy conscience If he has been reluctant to part with his *Groschen* the first time he has an opportunity to repent by the time the second man reaches him

CHURCH MONITOR WARNS THE INATTENTIVE

Another interesting participant in the services is the monitor who walks up and down the aisles admonishing the inattentive and light hearted His chief victims seem almost always to be very inoffensive-



Photograph by Kurt and Margot Lubinski

HOW DID YOU GET THE MEDALS GRANDPA? THE MINIATURES ASK

The one to my right shows I was wounded in the World War the Tyrolean veteran explains Eagle feathers in his hat attest his marksmanship Some day the youngsters may wear his old fashioned costume with ornate leather belt and suspenders embroidered with the edelweiss design

looking old ladies who are indulging in whispered exchanges of mild gossip

Sunday is the true holiday for natives and visitors alike Even the local train arranges its Sunday schedule to meet the wishes of excursionists

Going to the mountains is the principal diversions With knapsacks called rucksacks on their backs spiked shoes on their feet Alpine sticks in their hands a deer or chamois brush in their jaunty hats—if they wear hats at all—and a song on their lips they clatter along the narrow streets all



Photograph by Helga Glassner

FUR HATS AND HANDMADE DRESSES, FOR THE BAND CONCERT

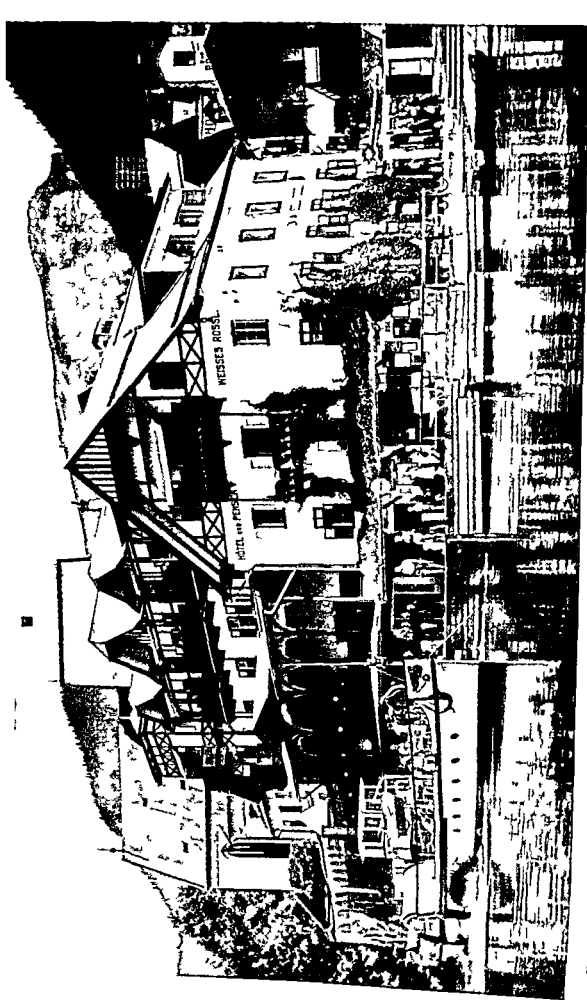
Seldom made now such festival costumes often represent a lifetime's work. Adorning the fronts are gay flowers, carved bone pins and heavy silver necklaces. These ladies of Salzburg hold big brightly colored rain roofs (umbrellas) and market baskets in which they may carry home live chickens or geese.



Photograph by Kurt and Margot Lubinski

FOR EACH STADY CUSTOMER, A PRIVATE MUG

In a special cupboard of this Salzburg beer parlor the proprietor keeps the favorite mugs of his best patrons. Some have silver or pewter covers and are embroidered with German sayings like "If you drink, you die. If you don't drink, you die. So drink!"



INSPIRATION FOR A MUSICAL COMEDY WERE THE WEISSES ROSSL AND THE LITTLE SIDEWHEELER THAT LIES THE ST. WOLFGANG SFF
 Porters and costumed summer visitors on the wharf carved wooden balconies steep mountains—even the lake steamer *Fra Josef*—are all reproduced on the stage in the play named for this White Horse Inn. Opening in Berlin in November 1930, the comedy has played throughout Europe and in the Argentine. Australia, Palestine and the Belgian Congo. One of the touring companies came to the Center Theatre in New York in the autumn of 1936. The real village of St. Wolfgang perches here on a narrow strip of shore at the foot of the Schafberg (page 483)

Photo graph by G. A. Le ger



Photograph by Josef Lehnert

IN PLUMED HATS AND LEATHER SHORTS THEIR EVERYDAY SUITS YOUTHS CAPER
FOR ADMIRING BROTHERS

In this old folk dance whose curious steps are handed down from father to son lads of Hunter Stoder mimic the peculiar capers and strange sounds made by the blackcock or male black grouse when it woos its mate in the mountains. To imitate the bird's flapping wings as it shows off before the hen the *Schuhplattler* dancers leap high into the air and slap the soles of their shoes with the flat of the hand. At the same time they whistle shrilly and make loud smacking or clucking sounds with lips and tongue.

through the night and early morning on their way to the Schaf Berg.

To see the sun rise over the Alps from the summit of the Schaf Berg is unforgettable. If you are not of the mountain climbing clan you can take the funicular up to the Schaf Berg the afternoon before and be perfectly happy and comfortable at the very homelike inn on the top.

The visitor can do everything the native does and more for all his time is leisure time. He can hire a car and make excursions as far as Königs See and Chiem See, in Germany, and still be back by evening. He can go to Salzburg which stands at the peak of sophistication as far as the Salzkammergut is concerned thanks to the annual Music Festival, which has transformed a provincial town into a cosmopolitan center.

I can see more people I know in a day at Salzburg than I meet in weeks in a city like Paris or London.

MUSIC DRAWS THE WORLD TO SALZBURG

In the days when only the guttural voice of the mountaineer was heard in the streets of Salzburg there was the saying: He who comes to Salzburg becomes in the first year, stupid; in the second, idiotic; and in the third a true Salzburger. And Mozart smarting from the tyranny of his patron (page 465), once wrote to a friend in a bitter moment: I hate Salzburg and everybody in it.

But Mozart would no longer have such an aversion to the town of his birth if he could return to it. For it is music which has lifted Salzburg to her present exalted state.

Here people of many nations and climes sit at table with the native farmers in the cool cellars of St Peter's Monastery. Or encounter Toscanini and Bruno Walter in the more lively out of doors Cafe Bazar chatting leisurely at bright colored little tables along the Salzach River. Or dressed in metropolitan finery and moving among the Arcos and the Hapsburgs come to rest in an upholstered chair in the more exclusive Mirabell Casino and sip the native *Boule* (a spiced wine) while the sensuous music of the gypsy orchestra from Budapest drives the cares of the world away.

When we went to Salzburg to attend the Festival events we routed out our American clothes but when we went in the daytime we usually stuck to our Tyrolean costumes feeling less conspicuous and more at home in them.

One of the jolliest things in Salzburg is the Alpina an out and out peasant entertainment given twice a week where you can have your fill of yodeling and slap dancing. Foreigners sit on a platform opposite the stage and one of the innocent tricks of the waiters is to guess your nationality and place what he has decided is the flag of your country in your beer mug. One evening at the big table at which my husband and I were sitting nine different flags were displayed.

Making excursions to the other lake towns by boat train or bicycle is a favorite diversion. Quite near each other are St Gilgen where Mozart's sister and mother lived St Wolfgang Strobl and Bad Ischl.

Bad Ischl formerly was the summer residence of the Emperor Franz Josef and because of its fine climate and health giving springs a meeting place in the old days before the war for the nobility of Europe.

DON'T SIT ON THE GRASS!

It still is a beautiful and interesting place where people continue to take the cure listen to open air concerts walk in the royal park (only mind you don't sit on the grass) and congregate at Zauner's for five-o'clock tea. But here they drink coffee instead richly reinforced by pastries and ices.

St Wolfgang on St Wolfgang See is charmingly approached by the boat which goes over from St Gilgen and around by Strobl. It has the most festive and gay appearance of all and really stands halfway between the sophistication of a town like

Bad Ischl and the utter lack of it in a town like Mondsee (Plate VII and page 481).

The first thing you do and you are almost compelled to do it is to see the church and the beautiful hand carved high altar done by Michael Pacher of Bruneck in 1481. This is St Wolfgang's pride and joy.

HIER STANDS THE ORIGINAL WHITE HORSE INN

Then you stop for a bite at the Weisses Rossl Inn now internationally famous because of the musical comedy which was written around it. Under its English title

The White Horse Inn has been delighting audiences in New York (page 481).

At St Wolfgang if you object to climbing you take the funicular railway to the top of the Schaf Berg nearly 6000 feet high. And while you are waiting you can dance the tango to very good music outside the hotel by the boat landing.

The cycling is excellent. The doctors and the priests make their rounds on motorcycles. The bathing is delightful when the weather is good.

Several of the towns have yacht clubs and the fishing is always fine even though Government controlled. You have to take an inspector with you when you fish and he not only charges you for his time but for the fish you have caught—if you still want them.

Just walking in the country is entrancing. Motor vehicles are few. The roads are hard. You see and hear birds you never saw before.

Everybody has a garden—the post office the public library the railway station the doctor the priest and all the little inns. Flowers grow late here because of the even climate and the generous rains. Those which you see in greatest profusion are Madonna lilies phlox pinks roses snapdragons and sweet Williams.

Two days without rain is considered a drought and with a great show of importance the town elders bring out the fire hose and drench everything in sight. I often used to go to the post office in a hurry with a letter for overseas to find the whole force out training roses over trellises.

But the post office had other surprises. One day I came upon a young American sitting gloomily outside the telephone booth. (The only available telephone was in the post office.)

Can you imagine she said. I've been



Photograph by K. Lophot

SQUEEZED BETWEEN LAKE AND MOUNTAIN, HALLSTATT MAY GROW SKYWARD ONLY!

A waterfall splashes through the center of this fairyland village where ground space is at a premium. To get to the railway station travelers must ferry across the Hallstätter See. The steamer is about to pull out from its pier so the boatman stands up to row his little craft hurriedly away. On summer evenings band concerts are held on the lake boats.

sitting here just three hours trying to reach a friend at a hotel in Brussels. But the German speaking operator at Salzburg can't understand the French speaking operator at Brussels and so we aren't getting anywhere.

Try telegraphing. I suggested. Have your friend call you here at two and stay around the booth. It worked.

LOST THE CITY OF PHILADELPHIA

Once I went to the post office to send a cablegram to Philadelphia. After much thumbing of a large official directory, a clerk announced with delightful frankness: 'Very sorry, but we are unable to locate any such place.'

It simply has to be there, I answered. 'That's where I live.'

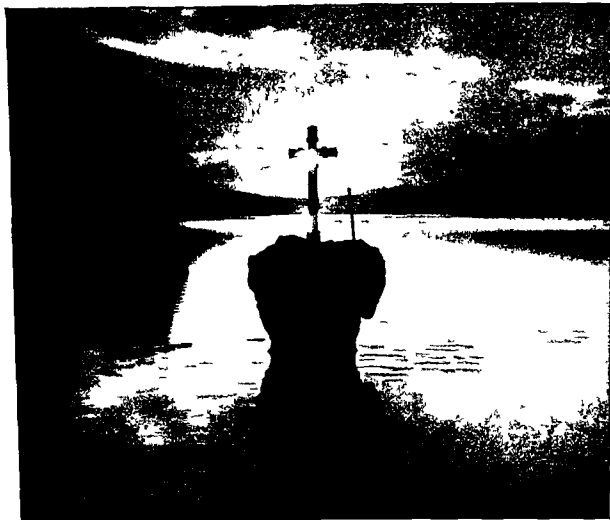
Greater efforts and then with a note of triumph, 'Here it is! Philadelphia, Tennessee.'

I shall never forget the day some friends of mine from home drove up to the Castle in their Ford station car. Such a thing had never been seen before.

Is it a saving wagon? the onlookers cried. meaning of course an ambulance. Everybody must get in it on top of it and be photographed standing beside it.

The naivete of the Salzkammergut is well matched by its humor. The gaiety of its people is spontaneous and their fun is kind. They may be poor but they can always smile.

Whenever the Castle steward whose business it was to heat my bath would meet me on the street, he was just as likely to



Photograph by Burton Holmes from Galloway

SUNSET CASTS A HALO AROUND THIS CROSS IN MEMORY OF A MOND SEE TRAGEDY

Country folk told the author how a bride and groom with their parents were rowing in a small boat on the lake. A heavy granite boulder tumbled down from the abrupt face of the Schaf Berg and crushed the entire party (page 465). The rock stands in the water where it fell a hundred years ago and to this day people lay flowers beside the crosses.

greet me with a cheery "Heisses Wasser" (hot water) as with "Guten Tag." And a personal maid at the Castle whom I once rebuked for not changing the linen oftener, would sometimes call out as she passed me "Frisches Handtuch" (fresh towel), without meaning in any way to be impertinent.

INNS HAVE AN HONOR SYSTEM

Another characteristic is honesty and trustfulness. When we went to dinner in the evening at any of the local inns we would give our entire order verbally to a waitress.

She made no memorandum, and later, sometimes hours later the head waitress would come around with the inevitable leather bag on her hip.

The table had been entirely cleared, and she had only our word for what we had eaten—and we had to remember whether we had snatched one or two Vienna rolls from a passing tray and how much red or white wine we had drunk, if any. She had no other way of knowing.

I have often bicycled up to a roadside inn and found, lying about on the tables, a considerable amount of money left by the customers who preceded me. The innkeeper was not even within earshot. The nearest thing to this that I can think of in our country is the man at the newsstand who seems to have a great deal of confidence in his passing patrons.

Simple, gay, trusting, warmhearted people, these Austrians, who wear their scars with so brave a smile.



BOUND DOWN THE GRAND CANAL, THE AUTHOR'S "YACHT" IS ABOUT TO SHOVE OFF

Curious peddlers and bicyclists stop to watch as Mrs. Price steps aboard the 25 foot fishing craft at Tungchow, China. Professor James A. Hunter, an American mission scientist, accompanied the Prices last summer on their voyage southward along the historic waterway. The vessel's captain Green Mountain King stows his passengers' duffel under the straw hood of the 'suite de luxe'.



A JOLLY HOUSEWIFE MOVES HER KITCHEN OUTDOORS IN FINE WEATHER

The portable clay stoves burn straw, since wood is scarce on the deforested Hopeh plain. With the fan in her hand, the mother blows the fire to produce a brief but hot blaze, quickly cooking the rice or millet in the thin iron pan.

GRAND CANAL PANORAMA

By WILLARD PRICE

With Illustrations from Photographs by the Author

I THOUGHT everyone knew about the Grand Canal. In my earliest geography lesson on Asia an imaginative teacher pictured China as a vast yellow land crossed by the Grand Canal and girded by the Great Wall. Thenceforth the mention of China always brought up the vision of majestic junks sailing along a magnificent waterway in the shadow of a mighty wall.

Then to be told in a Peiping travel agency that they could give me no information about the Grand Canal that they never had an inquiry about it that no one ever went there roused in me a feeling of personal resentment. It was as if one of my own most precious treasures were scorned.

Friends in Peiping had heard of cruises on the southern part of the Grand Canal between Soochow and Hangchow. But all the great northern stretch of the Canal was so far as sightseers were concerned unvisited and unknown (map page 488).

THE REAL HEART OF CHINA

And what a sight they were missing! The railroad and motor road are like pneumatic tubes that shoot passengers through North China often over monotonous stretches seldom giving even a distant glimpse of one of the greatest achievements of the ancient world.

One might suppose that the Grand Canal no longer existed—or at least that it was no longer used.

Yet after actually penetrating to it one has a curious feeling that here is the real heart of China. Moderns may go by train or motor. But 4 000 year old China still swarms along the ancient waterway.

These river dwellers bump cargo boats shout. Lend me your light. (Make way to pass) live down in the hold with a dozen children and the memorial tablets of ancestors tale down the great sail and mast to slip under ancient bridges and cook millet on the afterdeck (page 508).

They make regular visits to the prow to burn incense before the Goddess ever listening to the prayers of mortals who pass over water and toss a sack of grain to the bandits who if they were not given a little would take all.

Hearing that the head of navigation of the Grand Canal was at Tungchow a town twelve miles east of Peiping I took my wife blankets food and a Flit gun and sallied thence. There we found Professor James A Hunter scientist connected with an American mission. He agreed to find a boat for us and to leave his researches in animal husbandry and voyage with us.

ON BEING POLITE TO BANDITS

On the morning of departure we rose at dawn. At the breakfast table one of the ladies of the mission admonished Mr Hunter.

Now James if you meet bandits don't get angry with them. You did last time. You lost your temper! They might have shot you.

But they didn't. Hunter reminded her. I know. But that's no way to handle bandits. They're not used to being treated that way. You must be polite—and patient.

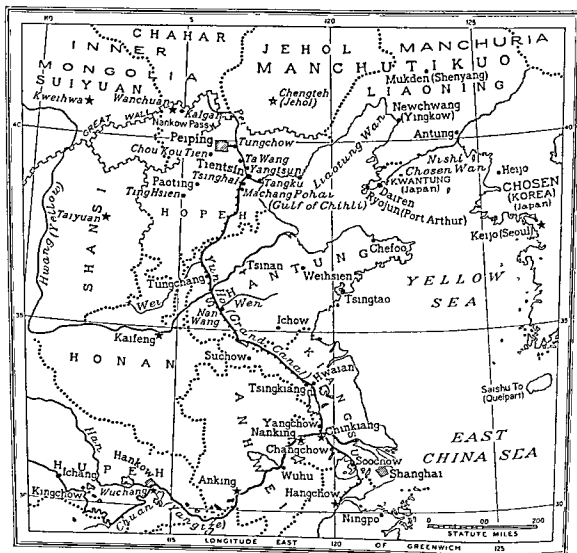
Hunter gave her his sweetest smile.

We rickshaded through the waking streets of Tungchow. Although this town lies in a back eddy aside from the main line of travel it is one of the most significant points in China.

Japanese troops marched singing through the great South Gate of the old city wall. They were bound for Peiping to receive a flag conferred by the Emperor. We passed the barracks extensive buildings made into a fort by a high serrated wall. A pink building the former Girls Normal School was military headquarters. The girls had been transferred to temporary quarters and mollified with free tuition and board.

Wherever the Japanese go they plant trees a mud flat was becoming a park and new roads were shaded. There had recently been staged a Clean up Day—like the semi-annual event in Japan when the contents of all houses are supposed to be taken out beaten and aired—but Clean up Day had not been much of a success in Tungchow. It was looked upon with suspicion.

Some protested that there had never been such a thing—so why should it begin now? Others argued that a good Chinese house



LONGEST MAN-MADE WATERWAY, CHINA'S GRAND CANAL STRETCHES 1,000 MILES
SOUTHWARD FROM PEIPING

Drawn by Newman Bumstead

Begun nearly 2,500 years ago, the giant ditch winds via Tungchow, where the author embarked to Tientsin, thence across the Yellow and Yangtze Rivers to Hangchow. Marco Polo was appointed by Kublai Khan to the governorship of the important city of Yangchow about A. D. 1282. He described the canal as "a wide and deep channel dug between stream and stream, between lake and lake, forming as it were a great river on which large vessels can ply."

wife cleans up every day and that to clean up only once in six months is disgraceful

BUILDING BOOM IN TUNGCHOW

Factories, banks, were under construction. The building boom of near-by Manchuria has reached Tungchow. We passed the rising towers of a 1,000-watt wireless station. Motor trucks loaded with building materials and military supplies shook the ancient streets.

A beautiful old Confucian temple had been repaired to accommodate the offices of the Government. There Chinese officials

and Japanese advisers work side by side. Above it towered the venerable Tungchow Pagoda, 13 stories high. Small bells fringing every tier sent music down the wind.

As we looked, a snow-white pigeon with a large black whistle on its back circled the pagoda, leaving a trail of throbbing sound. The whole tower, except for a room containing a Buddha, is said to be solid, and a proud citizen who stopped to enjoy our admiration of it informed us earnestly that foreign cannon could never harm it.

We paused again to buy coolie hats. Centuries of Chinese experience had de-



BUYER THIRTY CENTS? MAKE IT 20 " SELLER PAY 25 AND THE SHOVELS YOURS'

Bargaining is as necessary to trade as poling to a vessel says a Chinese proverb. These villagers at a temple fair squat on their haunches in perfect comfort enjoying the pleasant leisurely dispute over prices. Dr. Y. C. James Yen's educational movement has introduced improved farming implements along with its mass education program (page 498).

signed them to keep out glare and heat. Plain ones of straw only, with ribbons to tie under the chin or behind the head, may be had for three cents (U. S.).

We purchased the finest the store afforded: seven-cent hats, cloth lined for coolness (p. 493). The ribbons were patterned in blue and had a coquettish flare when tied in a bowknot beneath a masculine chin.

Through the musty darkness of the East Gate we went past the bayonets of the constabulary who guard the city by day and close the great iron-studded doors firmly against all comers by night, and arrived soon at the water's edge.

Here was the beginning of romance. Here was the northern terminus of what was, next to the Yangtze River, the chief highway of the Celestial Empire. Approximately 1,000 miles long, it connected two civilizations: that of the big rawboned millet eaters of North China with that of the sleek, neat rice eaters of South China.

ALONG THE "MOVE-GOODS RIVER"

Above this point barges could not go, although the river itself, the Pei, has its rise in the hills north of Peiping.

Some contend that, since this section of the great waterway is a river, it should not



DANCING REACHES NEW HEIGHTS AT A TEMPLE FAIR NEAR
THE GRAND CANAL

Spectators were more intrigued by the party of Americans than by these stilt dancers in gaudy antique costumes

It is considered as part of the Grand Canal which is therefore said to have its northern end at Tientsin. The matter seems hardly worth arguing except that it may be pointed out that much of the Grand Canal south of Tientsin also consists of rivers. In so far as was possible the Grand Canal was sensibly routed to follow the beds of existing rivers and lakes. There are few places where there is not a considerable current.

The Chinese name for the Grand Canal is Yun Hsi (hs) meaning river. Our Chinese boatmen referred to the whole colloquially as the Move Goods River. Our own term Grand Canal is of course un-

known to the Chinese. The practical fact is that the entire stretch from Hangchow to Tungchow is used as one thoroughfare.

Its most honored use in pre-railway times was the transportation of tribute from the southern provinces to the Imperial Court at Peking (Peiping). This tribute consisted mostly of bags of rice. They were unloaded here at Tungchow and laid out on the shore to dry musty from long confinement in damp holds.

The trip decidedly affected the flavor of the rice. People got used to it. A taste for musty rice grew up among the epicures of North China so that finally they could tolerate none that was fresh—a fact reminding us

A BARGE ON THE CHINESE RIVER

Even today there are rice dealers in Tungchow who by a special process make their rice musty to satisfy this demand.

From a tangle of boats a tall browned Chinese with an open face (so many Chinese faces are shut) and a pleasant smile came to greet us.

This is our captain said Hunter. His name is Wang Yu Shan. It means Green Mountain King (pages 499 and 514).

Green Mountain King grinned and led us to our boat (page 486) If we had been expecting a Cleopatra's barge, we should have been partially disappointed This was a barge, but Cleopatra might have disowned it There is no reason for passenger boats where there are no passengers This plain craft was not sufficiently skilled in the arts of deceit to conceal the fact that it was just an honest fishing boat on a vacation

The Chinese called it a "net boat" and Green Mountain King was a net fisherman of no small skill, as we were to find out The boat was 25 feet long, 7 wide, blunt at both ends, flat bottomed, equipped with a coal ball stove forward for cooking The crew slept in a covered hold aft along with other forms of life which neither rested nor slept

The suite de luxe was amidships It consisted of an 8 foot stretch of floor board canopied by straw matting on a bamboo frame This formed a sort of cave The roof was so low that one could not stand without making a deep and continuous Oriental bow doubtless good discipline for Westerners, who respond so clumsily to the courtesies of the East

We stowed our duffel, spread camp blankets on the floor, and reclined in regal indolence for our trip down the Chinese Nile



FOR HAND TO HAND FIGHTING HE PREFERS HIS BIG CHOPPER
TO THE STUBBY BAYONET

Light cotton suits puttees and low shoes are the usual military uniform of Chinese soldiers Natter dress marks two policemen approaching through Tungchow's city gate

Like the Nile, it flowed brown and swift, and our boat was no sooner free of its moorings than it tore downstream with the bit in its teeth Our speed was increased by the poles of the crew (pages 497 and 503)

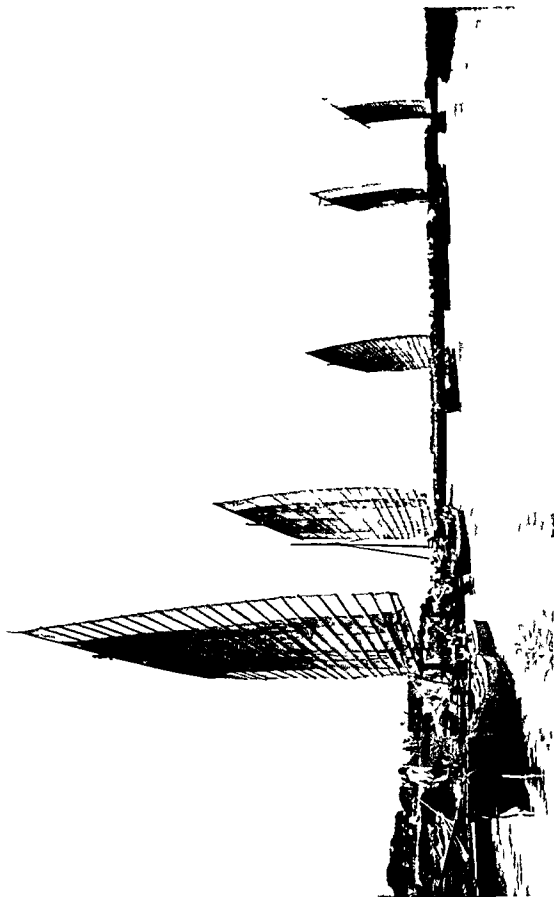
POLE POWER AIDS CURRENT

On each side of the boat was a narrow deck, or runway, extending from bow to stern Along each of these ran a stout lad with the haft of his 15 foot pole braced against his shoulder and the push pull end, consisting of metal point and hook, planted in the mud bottom Upon reaching the



LINE VOLGA BOATMEN, THEIR HUMAN MULES GRUNT AND STRAIN TO INCH THEIR CRAFT FORWARD

Each heaves in a harness attached to the towrope. The long cable leads aloft to the masthead so it will clear vessels moored along the bank and will not drag in the water. The mist's flexibility helps to ease the pull on the four-manpower team. Country folk use the towpath as a thoroughfare along the Grand Canal called "Muscovite River" by the author's boatmen. The high banks are a mile apart in some places and summer rains may flood the waterway to its full width.



LIKE A STately FLEET PASSING IN REVIEW CANALBOATS FALL INTO LINE BEFORE A FAVORABLE BRITZ

A battle ed pennant flutters atop the nearest vessel where four pronged anchor hang at the stern and the helmsman peers with a tiler Wooden lattens (liff n the sails In a squall or o her emergency the weight makes the sails fall safely out of the wind as soon as the halyards let go



GRAVE MOUNDS DOT THE GOOD EARTH LIKE A VAST ENCAMPMENT OF THE DEAD

Living farmers are far outnumbered by the race torn in these fields near Tsingha south of Tientsin. Newcomers to China see no such mounds from a distance often mistaking them for haystacks. In a family group (upper right) the father's grave rises above those of his wife and children. Burial grounds occupy valuable acres and interfere with cultivation on them also hand carriers of roads and railways. Chinese are loath to disturb the graves (page 512).



A YOUNG VILLAGE EDITOR CHALKS UP WORLD NEWS ON THE BLACKBOARD—AND EVEN COOLIES CAN READ IT!

People of Ting Hsien owe their literacy to Dr. Y. C. James Yen's mass education movement which started with 1,450 students in 1922 and within seven years had taught five million to read and write (page 498). After a four month course costing 12 cents graduates receive the "Literate Citizen" diploma—"much more picturesque than the sheepskin I received from Yale," says Dr. Yen.

stern he jerked his pole free (unless it jerked him overboard) and carried it back to the bow, then repeated the process.

The captain was perched on the prow watching for hidden trouble and shouted instructions to his small son at the rudder.

We darted to one side or the other of sand bars. Even the sixth sense of a boatman could not always penetrate the rich water—which by the way was not at all disagreeable in color, but looked exactly like delicious cocoa requiring only that you add sugar and serve—and we would come up with a sickening throw upon a concealed mud bank.

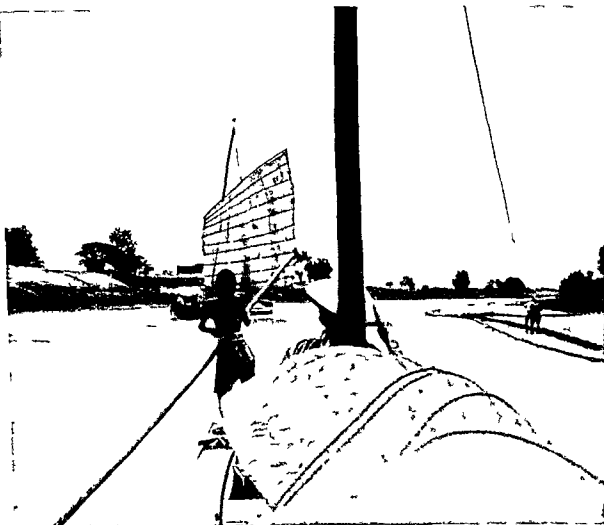
Then there would be a sort of college veil from the entire crew and a mighty straining and heaving against the strong current to get the boat free.

Some mud flats were ingeniously negotiated by whirling the boat like a merry-go-round screwing ourselves downstream.

Frequently we shot down a boiling swirling stretch of rapids. There the crew gave themselves up to unrestrained shouting and prancing quite disproving all statements about the unemotional character of the Chinese.

Our captain was like a small boy—a most engaging personality. He was in high spirits. He enjoyed giving orders. Was he not for the first time responsible for passengers just like the captain of an ocean liner?

His enthusiasm was dampened when he lost his footing while trying to hold the boat with his pole against the spiral course of a violent whirlpool. Over he went and came



"A THOUSAND STROKES WITH THE OAR AND TEN THOUSAND PUSHES WITH THE POLE ARE NOT EQUAL TO A RAGGED SAIL"

The truth of this proverb is evident here to Captain Green Mountain King. With the wind against him, he has ordered his son to pole and two men on the towpath to pull on the line leading to the masthead. An approaching vessel glides serenely along under its patched sail. A canalboat's mast may be unshipped and lowered when passing beneath a bridge.

up with a comically tragic countenance. He, the commander, had lost face and there was not a word from him for the next hour.

My boyhood notions concerning the Grand Canal were rapidly being modified. Here was no straight artificial trench with high banks. As in many parts of its vast length, the canal here followed the river windings and coiled dragonlike over the plain. True, there were high banks, but they were a mile apart and summer rains would swell the stream until it became a hurrying flood a mile wide.

But now peasants were harvesting wheat on the flood plain beside the canal, which as yet confined itself to a channel only one or two hundred feet wide. The farmers worked against time to complete their task before the July downpour.

Meanwhile the ragged poor squatted in groups waiting to glean. After the harvest they would go over the field to pick up stray heads. Neither farmers nor gleaners would get much. There had been no rain for weeks and the crop was poor.

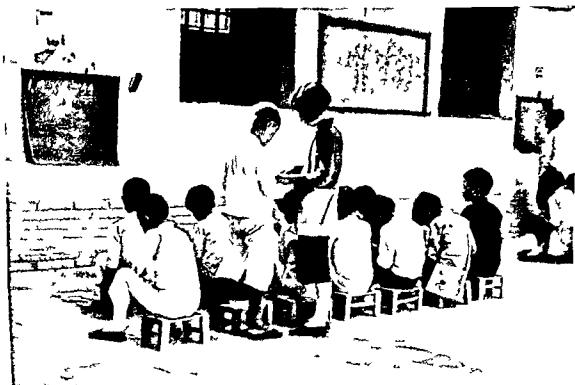
WHO OWNS THE BOTTOM OF A SHIFTING CANAL?

I had thought of the canal as stable and fixed, but it is fickle.

Last year the channel was there, said Green Mountain King, pointing to a cut in the plain a half mile away.

An interesting question came to our minds: Who owns the bottom of the Grand Canal?

Last year some farmer raised wheat or corn on the very ground over which our



A SCHOOLMA'AM, AGED 12, TEACHES HER PLAYMATES THE THREE R'S

The earnest bob haired miss of Ting Hsien is one of thousands of volunteer teachers in Dr. Yen's amazing mass education project (page 496). Working under an adult who supervises about 300 pupils she has probably just learned the lesson which she now passes on to her small class. Illiterates of all ages are taught 1,300 of the most useful Chinese characters.



CROSSED STRINGS SERVE AS TWEEZERS TO JERK HAIR FROM A YOUNG BRIDE'S HEAD

After marriage a Chinese girl should wear her hair squared across the brow. A band of cloth marks the fashionable line below which all locks must go. "Her friend holds the cord stretched between her teeth and her two hands and draws it in such a way that the small hairs are caught between two crossed strands and plucked out" (page 49).



NIMBLE LADS (CHOPSTICKS) ARE THE ONLY DINING TOOLS AT THE CAPTAIN'S TABLE

Squatting on the rail a precarious perch for anyone but a Chinese boatman Captain Green Mountain King enjoys a bowl of steaming rice with the crew. He invited his passengers to partake. It was only the usual polite form, writes Mr. Price, but we were ashamed that we had said nothing of the kind when we had enjoyed an abundant lunch three hours earlier (page 503). In front of the Captain's young son is the little galley, a kettle of water for tea simmers on the coal stove.

boat was now gliding. This year he had lost a good part of his small farm, perhaps all of it. He would be supported by the community until next year when the bad luck might turn to some neighbor—was already turning as a matter of fact if we might judge by the way the current was biting into the land at sharp bends and good grain undermined was tumbling into the water.

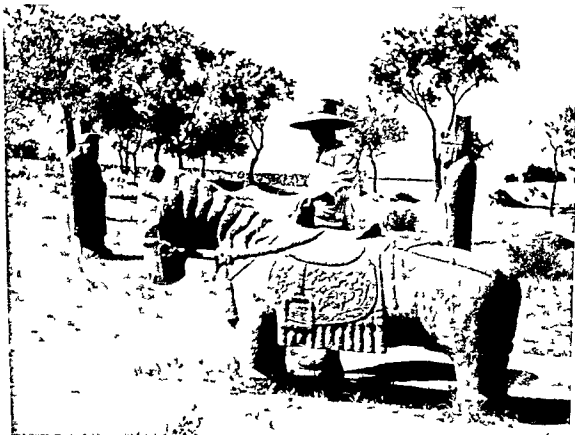
Where the stream cut against one or the other of the high dikes which flanked the flood plain, the villagers had strewn the bank with bricks for the current to gnash its teeth upon and had planted trees to hold the soil together.

It was then necessary to delegate police to protect the trees. For in this desperately

fruitless land, unguarded trees disappear overnight and are next seen as smoke oozing out through the cracks and cicada holes of kitchen walls.

Charming scenes unfolded ahead of us. Stretches of golden wheat or jade-green corn. Great sails moving as if through the grain. The glint of dragonflies, the flight of larks, crows and haughty hoopoes. The rich brown water, brown earth and brown mud houses against a cornflower sky. Beautiful old pagodas. Old temple roofs shaded by sacred trees, ancient and gnarled. A deep quiet over all, as of old age with folded hands.

Every country is older than its cities. And so is this country, more ancient than one of the world's most ancient of living



ONLY GHOSTS MAY GALLOP ON THIS STONE HORSE

For their convenience the saddled mount stands near the graves of a family named Chang one of whose members was an official under the Ming dynasty. Emperor Wan Li presented the dead man's spirit with sculptured sheep to eat, attentive stone servants, guardian lions and an assortment of carved dogs, cats and tortoises to play with during the hereafter. A dike of the Grand Canal rises in the background.

cities which you could see from the top of yonder Tungchow Pagoda.

Peiping's walls, gates, columns, temples, palaces, and palaces are old, yet they are young compared with this land of farm and village through which we sail. Here life moved along probably much as it does to day before cities existed.

When Britons were painting themselves blue, a wooden plow already had been invented and was furrowing these fields. Women were spinning silk. A calendar, weights and measures, bronze dishes and ornaments were in use. Most remarkable of all a way of writing and reading had been devised. And Chinese gentlemen were reciting lyric poetry a thousand years before the Golden Age of Greece.

* See "The Glory That Was Imperial Peking" by W. Robert Moore, NATIONAL GEOGRAPHIC MAGAZINE, June 1933. "Approach to Peiping" by John W. Thomason, Jr., February 1936 and "Peiping's Happy New Year" by George Kim Leung, December 1936.

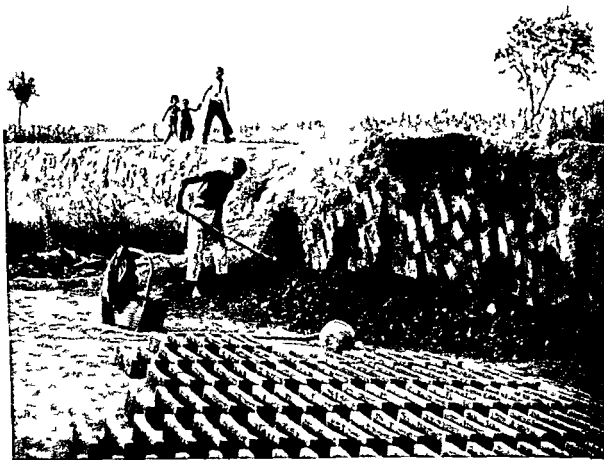
That seems long ago. But it is only yesterday in the life of this land.

When we try to think of men moving and working here ten thousand years ago, one hundred thousand, perhaps even a million years ago, our imagination breaks down and we can only rely upon the facts unearthed by the scientists. Fossils of the so-called Peking Man were found at the little village of Chou Kou Tien in 1929.

FIRECRACKERS AND BUGLES HERALD A RAIN PROCESSION

The age-old hush of the countryside was shattered by the blare of bugles and the thrum of drums. From a village on the dike came a strange procession. It was a crowd of villagers led by a boys' bugle corps. Red and blue banners waved.

What sounded like machine gun fire at a distance proved to be the crackling of strings of firecrackers dangling from the ends of long poles.



BRICK FOR THE HOMES OF CHINA

Hoing out clay the elderly workman seems about to undermine the road along which the little girl with a huge fan walks beside her father and brother. Mixed with chaff and short straw the clay in the molds is dried in the sun. Fuel is so scarce near Paoting that comparatively few bricks are baked in kilns and these are used mainly for foundations where ground moisture would soften the sundried kind.

A rain procession, I do believe said
Hunter

How about photographing it?

Bad joss. They wouldn't let you

Let's land anyhow

We leaped ashore and ran to intercept the parade before it should reach the canal. Coming near we saw what looked like a kitchen table being borne in great state on the shoulders of four particularly solemn village elders. Upon the table was a board and upon the board a savage scaly dragon three feet long.

What's the idea? I called to Hunter who ran beside me.

To bring rain. The dragon is supposed to be the evil spirit that has kept rain away. They'll drown it in the canal then rain can come.

The procession halted beside the canal. The table was set down. There was a sharp command. Men dropped to their knees about the hated dragon kowtowed until

their foreheads touched the ground and begged the evil spirit not to be angry with them for what they must do to it.

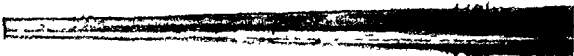
MUSICIANS FOR ANCIENT RITE WERE BOYS
OF 4 H CLUBS

There were no priests. The leader in this ancient superstitious rite was oddly enough the only modern in the crowd the young schoolteacher and the musicians were the boys of the 4 H Clubs! Thus do old and new merge in China. We asked the teacher for permission to make photographs. He consented rather gloomily.

I don't mind, he said. But it's the farmers. If it doesn't rain they'll blame you. You may be followed and hurt. You see it's a matter of life and death with them. So I wouldn't if I were you—unless you're sure it will rain.

Hunter looked at the sky.

I think it's going to rain, he said and we took photographs.



DROWNING THE DRAGON WILL BRING RAIN—UNLESS THE CAMERA IS 'BAD JOSS'

As the clay monster was slipped into the canal it sank amid the farmers' nervous shouts of joy. This was a matter of life and death to them. Mr. Price was told that if no rain came they would blame it on him for photographing the ceremony. A cloudless sky made the travelers fear pursuit that night. But at dawn rain fell!



'FORGIVE US O FAUL SPIRIT—WE MUST DROWN YOU SO THE RAIN MAY COME'

Believing a wicked dragon responsible for their long drought, these farmers made a ferocious monster of clay, with clams for scales. Lucid flared firecrackers popped, and banners waved as the villagers bore the dragon on a table to the canal. Before "drowning" the culprit they bow to it, burn incense, and beg it not to be angry with them for what they must do (page 531).



HER SUNBONNET, A COOLIE HAT HER CLOTHESLINE, THE LOWERED MAST

The boat's hood of straw matting is temporarily dismantled for rain came through it and soaked everything in the cabin. The two sailors plant their poles in the mud bottom. To push the craft forward each puts his shoulder against the T shaped butt and walks along the narrow runway as if on a treadmill toward the stern. There he jerks the pole free—unless it sticks and pulls him overboard.

The dragon was cleverly made of clay. The realistic scales were clamshells. The sculptor had shown no mean ability in designing the brutal head and the savage mouth bristling with ferocious teeth.

One could easily share the feeling of the villagers that when so horrible a monster had been extinguished the world would be a better place.

A DRAGON IS DROWNED

Another sharp command. The band burst into pandemonium. Firecrackers set up a terrific din and the dragon was borne to the water's edge and slipped from the board into the stream. It sank at once. There were nervous shouts of joy.

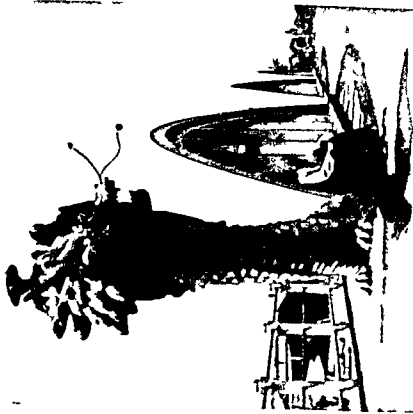
The procession re-formed and goose-stepped away through the wet morning grass, the boys playing lustily, some of their elders glancing back now and then to the swirling current where their enemy had disappeared. The impression they left with the onlooker was one of pitiful tragic earnestness. This meant so much to them.

We sailed on, or rather poled on. The wind was against us, but ships coming upstream were under full sail. The route was so tortuous that they could not rely upon sail alone, and half-naked men with wooden yokes over their chests trudged along the towpath (page 492).

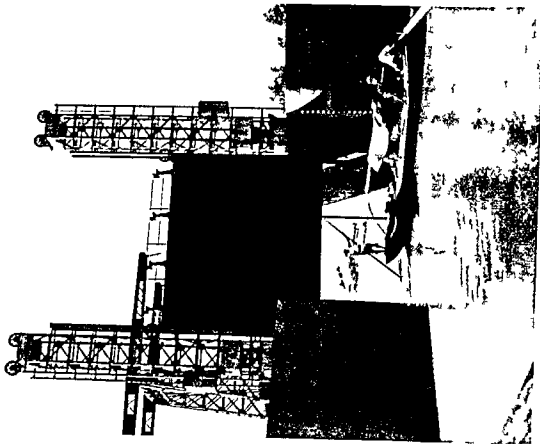
From the yokes extended lines which came together in a heavy towrope. This cable ran not to the deck of the boat but to the top of the mast. Thus the cable would ride clear of any intervening craft that might be moored alongshore, also its pull upon the yoke would be more easily borne by the men because of the flexibility of the mast.

Have you eaten? came the customary greeting from passing ships. And our men replied, We have eaten, although they had not and did not until three in the afternoon. Then they anchored and gathered about the coal ball stove.

The nimble lads (chopsticks) were poised above the steaming rice bowls (page 499). But before they plunged in Green



BUILT TO BRING LUCK, THIS DRAGON IS ON A SIT DOWN STRIKE.
 Peking capital erected the cement dragon over the T'ien Ho but citizens thought it was good fortune falling the cresting monument with a knobbed antennae. It still works. The local has been. Behind the boys on the scaly neck is the lot of Yanchow's fate.



WHEN FLOODS MENACE TIENSIN THIS DAM CHECKS THE RIVER.
 North China like the American Middle West suffers many an inundation. Rivers of the Hoangh plain converge and rush seaward through Tientsin threatening to fill up the port. This control station on the Pei Ho has a lock for boats and a spillway to divert water into an emergency channel.



FOR HUNDREDS OF YEARS SILT HAS FILLED THE CANAL, SO THE AUTHOR TOOK TO LAND WHEN WATER WAS DIVERTED FOR DITCHING

"About six miles below Tientsun he writes (page 513) our voyage in the net boat abruptly ended. We continued on foot along the bottom of the Grand Canal!" Twenty thousand men had been pressed into service to dig out the accumulated silt and carry it in baskets to the top of the dikes. On completed stretches of the dry canal old boys played baseball. One farmer had dug a well in the canal bottom and was carrying up buckets of water to his fields.



A PRESENT DAY STUDENT TAKES HIS QIUHUF FROM OLD-TIME STYLES

The trailed ornamental "tail" dangling from his shaved head is reminiscent of the queues imposed on the Chinese in the 19th century as a mark of submission to their Manchu conquerors. Eventually the people became proud of the odd coiffure but most of them discarded it after the overthrow of the imperial dynasty in 1911.

Mountain King politely turned to us with 'Won't you have something.' It was only the usual polite form but we were ashamed that we had said nothing of the kind when we had enjoyed an abundant lunch three hours earlier.

ASHORE FOR A TEMPLE FAIR

A temple fair attracted us ashore and we were soon engulfed in a swirling crowd which funned us even more interesting than the stilt dancers (page 490).

We have seen only one foreigner in a whole year, an old lady explained apolo-

getically 'He came with pills.

One man, his face twitching followed us steadily for an hour. Then he asked

'So you're not selling medicine?'

It was easy to guess the sort of medicine he had in mind. It is an unhappy fact that the only outsiders visiting many villages remote from road and railroad are the sellers of heroin.

Sunset found us on a rather forlorn stretch of the canal with no village in sight.

'Where do you sleep?' asked Green Mountain King.

There was hardly room in the boat for all 'One of us on board, two on shore, suggested Hunter. 'Just roll up in our blankets.

Green Mountain King was worried.

Too many bandits, he objected. 'Better go on to the next watchman.

WATCHMAN ARMED WITH A RATTLE

Dusk was deepening when we came to a small mud hut occupied by a lone watchman. 'This was a loading station.' Farmers might bring produce here to be placed on board the canalboats. But at present there were no boats and no farmers; only the frail little old watchman armed with a rattle.

'So—this is our staunch protector against a bandit fray.' I commented.

'It's done with money, not with guns' Hunter explained. This watchman represents all the farmers of this district. They make a bargain with the bandits to keep away from this loading station. So we are quite safe here except

He was studying the sky. The stars were shining brilliantly. There was not a cloud the size of a man's hand.

I didn't need to ask what he was thinking. I had thought it all afternoon.

But I think the teacher exaggerated, he said. Not really much danger of our being followed. All the same I wish it would rain.

Hunter slept in the boat, we two on our cots set up in a tiny shed mud made, roofed with cornstalks and half filled with coal balls (page 508). We lay listening to gentle churning sounds in the walls and roof and clutched the Flint gun. The shed was open to the night on one side. It was easy to imagine rain fanatics crouching yonder among the standing corn.

Toward midnight Mary gasped. The dragon! She awoke with such a violent start that her cot collapsed, tossing her into the pile of coal balls. The watchman alarmed, shook his rattle and stayed discreetly indoors.

At dawn we awoke to the blessed sound of rain pattering on the cornstalks above our heads. We sailed away and fairly luxuriated in the life-giving drops that trickled down our necks as we huddled over the preparation of bacon, eggs and coffee on the galley stove.

Toward noon the rain stopped. Tired of close quarters we walked along the towpath and viewed the pageant of Chinese life.

Farmers lighted incense before a small brick temple of the fields in gratitude for the rain. High land that would not be reached by the flood was being sowed, a little process on moved across it, the first man plowing, the second dropping in the seed, the third sifting fertilizer into the furrow, the fourth closing the furrow and tamping it down by means of a scraper and roller.

A blindfolded ox and blindfolded donkey trudged about in a circle drawing water from a well. A new well was being dug by an elaborate and lofty well digging machine made of rickety bamboo.

It was odd to see a man with a sledge hammer breaking up his bed as if in revenge for the sleepless nights it had given

him. The Chinese bed or *kang* is made of brick. Its hollow interior is heated by a fire. The chemical elements in the smoke combine with the mud and chaff of the bricks to make an excellent fertilizer (page 513).

Therefore when the family can afford a new bed the old one is taken apart, carried to the field, set up again and left there a bed in the open until fertilizer is needed. Then it is attacked with sledge hammers and the resultant powder goes into the furrows.

The path skirted a village and we got intriguing glimpses of domestic life. Here it is not kept so closely hidden within walls as in the towns and cities.

A housewife was making slippers. To give bulk to the sole she had inserted between the two thin layers of cloth a copy of the *Los Angeles Times*. Old American newspapers are specially imported into China for this purpose (page 493).

An old lady was deftly jerking hairs from the forehead of a young woman by means of a cleverly crisscrossed string. Upon marriage a woman should wear her hair squared across her forehead so all hairs below this line must go. Her friend holds the cord stretched between her teeth and her two hands and draws it in such a way that the small hairs are caught between two crossed strands and plucked out (page 498).

A BABY CHOOSES HIS VOCATION

An excited chattering led us into a courtyard where we saw a curious ceremony. On a small table was a basket containing an abacus, a hammer, a hoe, a Chinese dollar bill, an inkstone and a writing brush. Near by sat a child on his mother's lap (p. 510).

He was one year old—and it was time for him to choose his vocation. Which ever object he touched first would indicate his life work. If the abacus he would be a merchant, the hammer an artisan, the hoe a farmer, the bill a banker, the inkstone or writing brush a scholar.

Two objects instead of one had been supplied to indicate scholarship because of the fervent hope of every Chinese family that the son will be a scholar.

The baby gurgled, reached firmly, clutched the dollar bill. It was an omen of the passing of the ancient culture and the coming of modern commercialism and industrialism to China.

One man was cleaning a rifle but hastily



READY FOR BANDITS OR INSECTS, THE PRICES CAMP IN A MUD HUT THEIR
FIRST NIGHT OUT

Human marauders were kept away by a watchman at a near by canal station. Sleeping on cots under the cornstalk roof of this shed the author and his wife felt safe from everything except the rain makers whom they had photographed earlier in the day (pages 500 503 and 507)



A FLY GOES OVER THE SIDE AS THE CAPTAIN'S SON BOILS RICE FOR DINNER

No strict believer in hygiene was this youthful ship's cook. To get drinking water, he reached over the side with a roundopper and scooped up muddy brown water from the canal

concealed it when he saw strangers coming.

The atmosphere of impending trouble hangs heavy over North China. Everywhere there are preparations for no one knows what—certainly those who are preparing do not know. Particularly in the neighborhood of Paoting, where Japanese influence from the north meets Chinese authority from Nanking and Communist pressure from the west, the villagers are nervously getting ready for unknown events.

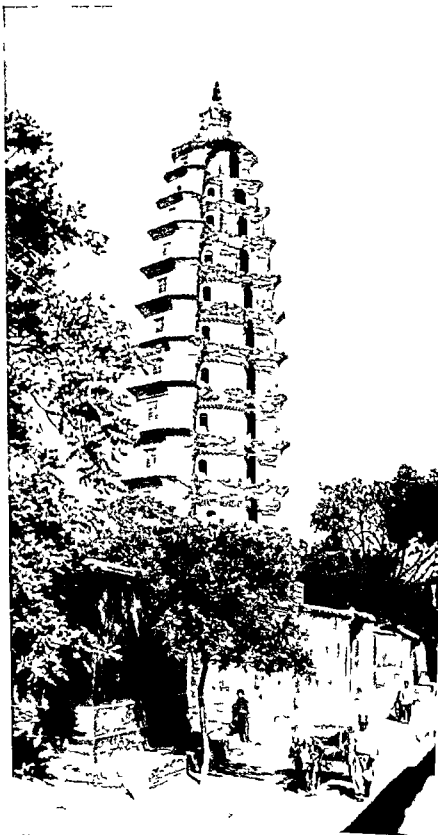
CO-OPERATIVE FORTIFICATION

It would be too great a task to fortify every village. Therefore the folk of a dozen or more villages co-operate to fortify one. Within its walls they will all take refuge in case of necessity.

We had cycled out over razor-backed paths from Paoting to such a village and had been amazed at the thickness and strength of the mud ramparts, the depth of the dry moat on the outer side of the wall, the belligerent aspect of the mud forts, one at each bend in the wall.

It took all the men of 14 villages eight months to do it,' a citizen told us.

How wars and rumors of wars drain the energy of China!



ONE SIDE OF THIS PAGODA FELL AWAY REVEALING AN OLDER STRUCTURE INSIDE

Built more than a thousand years ago, the many-storied tower in the Ting Hsien district was named Iiao Ti or Watch for Enemies. The slender inner building was laid bare only about 50 years ago. Pagodas are sometimes solid, but many have stairways leading to the top.



CHOOSING HIS LIFE WORK A ONE YEAR-OLD PICKS THE DOLLAR—HE'LL BE
A BANKER

According to old Chinese custom the baby is held on his mother's lap near a basket containing various articles. The first thing he picks up indicates his future career. If he had chosen the abacus or counter he would be a merchant; the hoe a farmer; the hammer an artisan; the ink stone or writing brush a scholar. His parents supplied two articles indicating scholarly profession; he would select this most honored profession. But the youngster "gurgled" reaching firmly clutched the dollar bill" (page 507).

Our boat sailed through a gorgeous canopy and purple sunset into a flea-bitten settlement bearing the proud name of Great Wang Town (Ta Wang Chiang). It was chiefly the village of the Wang family. There are hundreds of villages in China inhabited by a single family. And so complicated are relationships early and late intermarriages and adoptions that the truth

The boy is father to the man is here carried a step further and a lad may actually be grandfather to a patriarch of seventy.

Again the problem of sleep. The ramshackle houses, howling curs and piratical aspect of the inhabitants did not suggest a good night's rest on shore. The Wangs flocked to see us and streamed out upon the flat deck of a ferry barge moored to the bank. We drew up alongside the ferry.

For a few moments, gaping silence. It

was an evil-looking crowd. Some peered down into our boat, seeming to scan our possessions with covetous eyes.

"Trust we haven't dropped into a nest of canal pirates," remarked Hunter. "We'd better try to drum up a little friendship. Where's that magazine with the pictures in it?"

A GEOGRAPHIC WINS A FRIEND

I handed him a copy of THE NATIONAL GEOGRAPHIC MAGAZINE. He clambered up upon the barge deck and opened it. Instantly he was mobbed. Everyone wanted to see at once. With a football rush a brawny fellow pushed his way through to Hunter.

"I am the headman," he said. "Who are you?"

Hunter explained and leguiled the big

fellow with pictures The headman peered at the unfamiliar English type

Hunter indicated me

He wrote this

The headman inspected the type again with the air of an expert examining a sample of calligraphy

He writes very well he said finally
It looks almost like print

He pointed to a mud house half hidden behind compost heaps

That is my house Come up and drink white boiled water

We went up sat on the headman's brick bed and drank white boiled water In many poor Chinese villages tea is rare The water is called white to distinguish it from tea

BOUND FEET AND QUEUES SURVIVE

The villagers crowded into the room Some of the old men still clung to their queues—although they could have made six cents per queue by selling them in the hair marts of Tientsin whence they would be sent to America

We noticed that not only every woman but every girl in the room stalked about on bound feet The custom is happily disappearing in the cities but not in the country A country swain will not marry a girl with natural feet They are considered huge flat and ugly

Stay the night said the headman
Sleep here

Since this was the only room of the house it was evident that the entire family would sleep with us And it was more than probable that half the village would stay to watch us sleep

Hunter declined courteously explaining that we had full equipment in the boat We went back to the shore The lady was made comfortable in the boat and two cots for the men were perched on the high flat deck of the ferry barge Both craft were then pushed off from shore as a precaution against bandits and anchored in midstream

One of the crew was placed on watch We lay gazing up at the stars Gradually a blanket of river mist covered us

In the morning our blankets were so soaked with mist that we could wring the water from them

The canal was now deeper wider fixed between permanent banks and alive with traffic The usual cargo boat was really

two boats united As such a craft passed us we could suddenly see through the boat where the two sections joined Two hulls instead of one make shallower draft possible and cleaning easier Also the different sections can be taken to different places for loading or unloading

SMILE WHEN YOU SAY SON OF A TURTLE IN CHINA

Green Mountain King slung his net and drew in some toothsome fish that added zest to the menu for both crew and passengers With less success he tried to snare turtles which lay on the mud along the water's edge He politely referred to them as round fish The word turtle is considered improper, since it is used only in curses and to call a man son of a turtle is the worst of insults

Roofs were being re-mudded against the coming rains The fields were still dry in spite of the shower following the rain rites and sweeps were being used to raise water from the canal to the fields In some places water was being pumped from a well the bottom of the well being connected by a tunnel with the canal

Throughout this country cotton was being grown by behest of Japan which has undertaken to buy all the cotton North China can produce American varieties have been acclimatized in experimental farms operated by Japanese agriculturists The seeds are distributed free to the farmers

Cables across the canal served as guide lines for ferry barges Traffic must either push the cable up and crawl under or call to the ferryman to sink his cable so boats can pass over

One ferryman had contrived a different scheme He anchored one end of a cable in the mud bottom midstream and made fast the other end to his ferry Keeping the cable taut he would swing in a downstream arc from one shore to the other The strong current would carry him through the first half of the semicircle so smartly that the momentum and only a few pushes of the pole brought him up to the other bank

POLICE STATION IN AN OLD TEMPLE

An aquatic moving van passed The boat was loaded with valuable household goods traveling under police escort Atop the pile three policemen perched with their rifles The constabulary flag waved above them



FRIENDLY FARMERS DEMONSTRATE AN AGE-OLD DEVICE FOR COVERING SEED

After the plow has opened the furrow and seed has been carefully planted with fertilizer the horse-drawn crescent-shaped scraper covers it up by pushing the hills of dirt toward the center. Behind comes the stone roller, pressing down the loose soil so the wind will not blow it away. About a third of the cultivated area of Hebei Province is devoted to millet and sorghum.

a warning to raiders that there must be no interference with the rich man's possessions.

Night fell as we came to a considerable village. We determined to pass on for the place was in Chinese parlance hot and noisy. But as we learned later there had just been a kidnapping a few miles away and the local police were nervous. They promptly pursued us and invited us to spend the night in the police station!

It was explained to us that this was purely for our own protection. But was that a glint of suspicion in the chief's eye as he pried about in our belongings and investigated the hold?

At any rate we returned to the hot and noisy spot. Landing by the light of oil lanterns among a crowd clustered about jugglers and strong men balancing stones we were escorted through dark alleys where black dogs leaped snarling from doorways to the police station. That edifice was an old temple where the constables had moved in with the gods.

The great gates of the high courtyard wall clanged the crowd was shut out and we were shut in. Then came innumerable

questions running on until close to midnight. The examination was courteous but exhaustive and exhausting.

At last we were permitted to sleep on the cots of a barracks hall in the company of a guard, a portrait of Sun Yat Sen and a hungry horde of sand flies. In the morning our jailers or protectors now most cordial sped us on our way.

The sight of this day was the great lock and dam constituting the control station of the north branch of the Grand Canal. This dam prevents floods from inundating Tientsin and it diverts into an emergency channel the flood sediment that would otherwise silt up Tientsin's harbor at Tangku (page 504).

IN THE LAND OF THE DEAD

Soon we were skirting Tientsin—for the main waterway does not go through the city. Then on south toward the Yellow River. We were now passing through a land of the dead. Some have estimated that in the densely populated provinces five percent of the arable land of China is obstructed by graves. In some localities it is more than



WHEN A FARMER TIR'S OF HIS BID, HE MOVES IT OUTDOORS FOR DRIING

After years of use the bed is impregnated with smoke from the fire which heated its hollow interior. Thus chemically enriched the mud and straw bricks make excellent fertilizer. "It was odd," writes the author (page 507) "to see a man with a sledge hammer breaking up his bed as if in revenge for sleepless nights." A mud roof protects the bricks until the farmer is ready to pulverize them.

nine percent. Here at least 80 percent was so pre-empted (page 495).

The Government of China has ordered that henceforth all dead shall be buried in cemeteries, not in the fields. But it is doubtful whether such a law can be enforced, since it flouts age-old custom.

About six miles below Hientsin our voyage in the "net boat" abruptly ended. We continued on foot along the bottom of the Grand Canal.

Like the Israelites we went dry-shod—for the waters had been held back at Machang and diverted into a branch canal so that the main channel might be dredged deeper and wider (page 505). Boats, stranded in mid-channel, lay waiting.

Wary of walking, we went on and on by ricksha, then by train.

A stretch of about fifty miles had been excavated a month after our visit. It was again opened to traffic. Below Machang a small steamer carries travelers further. First and second class passengers ride on the steamboat, third class on the barge towed behind.

Then come hurdles—silted portions of the canal that have not been cleared for decades and make uninterrupted progress from one end of the Grand Canal to the other impossible in this way.

We went no farther, since our special study for the time being was North China, and turned aside to visit Shantung Province, with its lovely twin pagodas, its cave dwellings in the loess cliffs, its coal and iron in which Japan is interested.

NEW RAILROADS PLANNED

New railroads are planned to transport the raw materials of China which are needed in the industries of Japan. But the extension of railroads will not collapse the Grand Canal. In fact, it seems destined to have a new lease of life. Increasing trade demands its increased use, and there are official plans for dredging the entire channel.

Even then, there will still be slight interruptions where boats must be hauled up or down stone barriers, since the level of the canal varies, sometimes as much as thirty



GRACEFUL AS A DANCER CAPTAIN GREEN MOUNTAIN KING FLINGS HIS NET

The meshed fabric folded so that it looks hopelessly tangled when first opened spreads out smoothly as it settles into the water. Fishermen we enjoyed by passengers and crew thanks to the Captain but luck was not so good when he tried to snare turtles in the canal (page 511)

feet. Of course these barrages may in time be replaced by locks.

After following the bed of the Pei Ho above Tientsin and the bed of the Wei below the canal steps upward by barrages traverses the Yellow River with perilous turmoil of cross-currents reaches its highest point at Nan Wang where the Wen River enters lazies through a series of lagoons then swoops with strong and dangerous current to the Yangtze River.

PART OF CANAL 13 CENTURIES OLD

The latter stretch is probably the oldest part of the Grand Canal. According to one of the books of Confucius it seems to have been built about 486 B. C.

The waterway makes use of the Yangtze for a short distance upstream then turns south again and moves in stately fashion through Soochow to Hangchow.

The Grand Canal is the backbone of China. The Yangtze and Yellow are its ribs.

Life tends to grow up around water ways—think of the civilizations of the Nile, the Euphrates. The oldest Chinese life—some of the oldest human life so far as present incomplete evidence testifies—seems to have developed in the Yellow River Valley and along the northern rivers which were later to be integrated as the northern stretch of the Grand Canal.

In this unthinkable ancient land great changes are today taking place. They have political, social, industrial significance. And yet when all is said for them they are bubbles on the surface. Beneath them the old China moves on placid, persistent with a sure instinct for life.

The powerful undercurrent will go straight on, carrying the strength and conservatism of the old China into the new. And if we are reincarnated a few millions hence and take another boat trip in this land, I think we shall not be in doubt we shall still recognize it as China.

THE SAGUARO FOREST

By H. L. SHANLY

Former President, University of Arizona

"NO, No!" said my friend from the East. "It cannot be true! It must be the tequila I had in Nogales!"

Little wonder that he doubted the accuracy of his vision. He was looking out for the first time from the crest of a hill over that wilderness of unreality, the Saguaro National Monument east of Tucson, Arizona.

Before him, limned in olive green against a yellowish green foliage of mesquite and creosote bushes, the giants of the cactus world stood like immense fluted Greek columns, mile upon mile of them, stretching as far as the eye could see to the very base of the lofty Santa Catalina Mountains.

A FOREST OF CACTI SEEMS UNREAL

We call this a saguaro (often spelled sahuaro) forest, and it requires trees to make a forest, a dense stand of trees at that. Surely no cactus can rank as a forest tree! But there they stand, mighty trunks two to three feet through, rising 15 to 40 feet high, often branched, the huge branches a foot and a half in diameter, the larger plants weighing probably from six to ten tons each.

Their stand in places is as dense as that of the yellow pine in the Rockies or even that of the red pine in Michigan and Minnesota or of the long leaf pine in the South.

My friend's bewildered amazement brought back to my mind one of my former trips through this area.

An old trail leads across the foothills just west of the Tanque Verde Mountains and connects the Tanque Verde Creek with the railroad station at Vail, Arizona. Late one November afternoon several years before Dr. D. T. McDougall and I had been picking our way carefully along this route over the rocky hills north of Vail.

We looked out over a broad valley to the peaks of the Tucson Mountains thrust up in a bluish purple haze on the western skyline, and north to the peaks of the Santa Catalina just tipped by the setting sun.

A wild, weird place it was, with strange forms of vegetation on every side, a rocky, steep arroyo at the right, the whelping of a coyote echoing against its banks and beyond it the desert slopes of the Tanque Verde Mountains.

We recalled similar experiences in distant lands. In fancy we saw again clouds drifting across Table Mountain in South Africa, and the waves dashing against the shore, the slopes a garden of proteas, ericas, gladioli, silver trees, and geraniums plants known in America only as greenhouse plants but there wild and natural and different.

We thought of the fern carpeted redwood forests of California with light streaming diagonally past the great trunks, old, stately, grand, and inspiring beyond words and of the equally interesting cedar, hemlock, and Douglas fir forests of Oregon, Washington, and British Columbia.

We talked of the massive baobab trees of Africa, different and attractive with their swollen trunks and large white flowers and cream of tartar fruits.

Close at hand we had the Idria of Mexico, a tree with pointed columns widened at the base, related to the scarlet-tipped ocotillo.

We had wandered far, both of us, and had seen most of the wonders of botany, yet we agreed that the saguaro forest was unique in our experience.

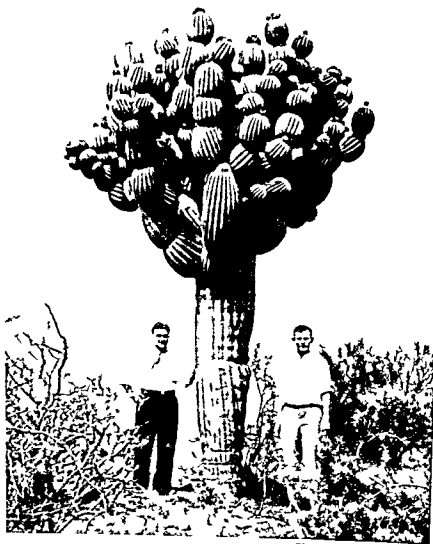
THE CONQUISTADORES NAMED THE SAGUARO GIANTS

As we listened to the hum of a transcontinental plane passing overhead, we recalled the records of this historically oldest portion of the United States. The Pilgrim Fathers were unborn, for the year was 1539, when the first white adventurer gazed upon the immense forests of giant cactus. The Seven Cities of Cibola were not yet proved a myth.

Coronado and the Conquistadores, marching north next year from Mexico City in search of the cities of gold, also found the giant cacti and named them *saguaros*.

A century and a half had been ripped from the calendar of the ages before this forest was again visited by a white man.

This time a man of peace looked upon the fluted giants and wondered at the marvels wrought by the divine Creator. The highly educated Jesuit, Father Eusebio Francisco Kino, did not pass on northward as did Coronado but remained to build the beautiful mission, San Xavier del Bac, which we



Photograph by H. L. Shantz

FREAK BRANCHES RESEMBLE A CLUSTER OF TOY BALLOONS

Buds of this saguaro instead of developing normally grew into globular chainlike branches one on top of the other. Within the mass of entangled arms a prickly pear is growing dependent entirely upon shoulders for moisture.

could see standing out pure white in the haze of the sunset far to the west. Construction was begun about 1700.

The white man was a late comer in this region. At our right were the rocks on which primitive man had written in pictures centuries before.

Everywhere were pit houses and old grinding places and at our left and farther north lay a great pueblo like the Casa Grande. It is now a university project where the youth of today will study the civilization of the distant past.

Before the Spaniards had set foot on American soil even before the Romans had

entered Spain this land had been used by man. The fruits of the saguaro had sustained him and the forms of these giants had influenced his arts. Everywhere the area lives in rich relics of past civilizations.

Looking back toward the old pueblo we thought of the Mormon Battalion of a half thousand determined men their wagons drawn by tired and famished mules pushing cautiously up to the walled city of Tucson in December 1846.

It was the strongest presidio of Sonora well garrisoned walled and equipped with cannon. Not surprising was it that the half naked half fed and half armed Mormon band approached with apprehension.

A few days before they had been attacked by wild bulls on the San Pedro where they had lost several mules and in self defense had killed from 20 to 60 of the cattle. But the citizens and soldiers of Tucson alike deserted on their approach. The former soon returned and furnished flour meal tobacco and quinces for the men of the battalion and grain for the mules.

The Old Pueblo now a part of Tucson is the natural gateway to the saguaro forest. The city of Tucson was first an Indian village later a Spanish settlement then a pioneer town. Now it is a modern



Photograph by A. R. Buehman

GENERAL JOHN J. PERSHING INSPECTS A PIPE ORGAN IN THE SAGUARO NATIONAL MONUMENT

The General of the Armies of the United States, who is a Trustee of the National Geographic Society, winters at Tucson, Arizona, and is a frequent and interested visitor to the forest of giant cacti. Here the guide points to a clump of saguaros that have not yet formed branches. Arms of the one beyond General Pershing have protruded from the trunk and are beginning to grow upward (page 529).

university city. It was a walled city when the Declaration of Independence was signed and remains one of the oldest communities in the United States. Still retaining something of the Spanish atmosphere, it is the home of the cattlemen of the old southwestern ranchos.

A DESERT THAT IS NOT DESERT

The desert about Tucson is unusual. Perhaps it should not be called a desert. It is marked by broad expanses of creosote bush with delicate tracery, deep green lacquered

leaves which glisten in the sunlight, hardly in keeping with a desert environment.

In places we saw the creosote bush give way to many species of cholla, tree-like *Opuntias* with never-ending change in form and color. Some of them are almost snow-white with black lighting due to large sheathed spines, while others are slender and in varying hues of green.

The whole is splashed in the early spring by a rich and varied display of flowers, and later in the year by varicolored fruits.



SEVERAL TIMES DESTROYED BY INDIANS, BUT EACH TIME REBUILT, SAN XAVIER DEL BAC GLIMES LIKE A WHITE JEWEL SET IN THE DESERT

This is a photograph by A. R. Buchman

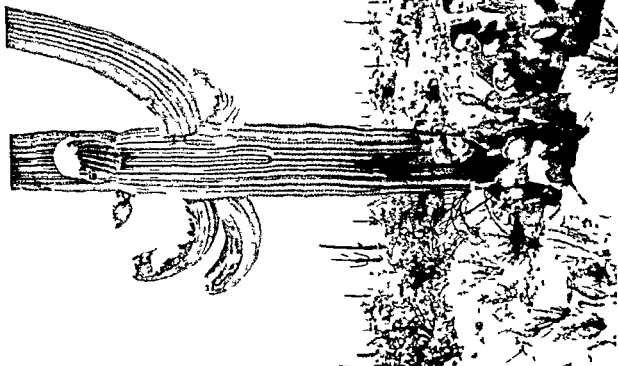
Spanish Fathers established the shrine near a spring about 1700 when Arizona was a Mexican mission. The present structure completed in 1797 was abandoned 26 years later. At intervals since then red men have used it as a church. Today it is part of the Papago Indian Reservation near Tucson. San Xavier's founder, Father Kino recorded that he grew wheat, maize, grapes, figs, oranges and melons. The Papagos still grow these crops on their farm lands near the mission.



The graph by H. I. Shantz

THIS PLUMBING OF A CACTUS BECOMES ITS SKELETON

Woody, wlem tubes cut up living saguaros. When woodpeckers cut through the pipes detour channels are developed (page 530). The strong strands help to support the plants which sometimes grow 50 feet tall and weigh 10 tons or more. Skeletons of dead cacti often stand upright for years



© AP from Picture Inc

SNOW ON A CACTUS JUST ANOTHER OF NATURE'S TRICKS!

Delighted by the heaviest snowfall in 35 years, girls here inspect purplish flat lobed Opuntias and find that little harm resulted from the flurry. The photograph was taken January 8 1931 in the Saguaro National Monument near Tucson

The turn or flat stemmed *Opuntia* forming low masses, is covered in the spring with yellow or purple flowers and later in the year with large deep-purple or carmine colored fruits. Nor is the beauty of the desert limited to cacti and desert shrubs.

The many kinds of flowering plants give constant change to the landscape. In winter plantains, primroses and geraniums and in summer never ending displays of yellow and white composites characterize the ground cover.

As we approached the saguaro forest and traveled to higher land the desert became more luxuriant and the paloverde appeared a beautiful tree in which the branches are as green as the leaves and which in late spring is covered with a mass of lacy lemon colored flowers. This tree stands so close on the higher ridges that it constitutes what would be called in many parts of the world an orchard steppe.

Here also are occasional acacias and the desert hackberry. The latter a low tree or shrub is covered in September with light red or orange berries so numerous as to give a decided tint to the whole plant. The berries are among the chief sources of food for quail and other birds and the branches are thick and spinny so that they afford protection to the quail from the attacks of owls and coyotes.

Another attractive shrub is the *Lycium* a low bush often red with a heavy load of fruit which likewise furnishes bountiful food for birds.

We saw numbers of the large barrel cactus the *bisnaga* which is in flower in late September. The barrels leaning toward the southeast are capped by dense crowns of copper red flowers and later by light yellow spineless fruits. This cactus has been used as a source of drinking water and also for making cactus candy a practice generally discouraged since it was rapidly destroying one of the most attractive of the larger cacti (page 524).

The ground is sometimes completely covered with the papery flowers of the small white composite *Psilostrophe* or the somewhat larger and equally papery yellow flowered *Zinnia*.

The white buckwheat adds beauty to the desert and the annuals which spring up following the rains carpet the desert floor with varied colors.

Probably at no time is the desert more interesting than after the summer rains in

August or September when it becomes as green as Ireland. The masses of cactus flowers however come in March or April. There is something in every season to attract the botanist.

The watercourses are marked especially by a thick growth of mesquite, paloverde, acacia and hackberry and the landscape is at times colored by rayless goldenrod and the beautiful daisylike *Baileya* and small orange-colored hollyhocks.

The *ocotillo* with its long wands often five to fifteen feet in length and fringed with delicate leaves is so unusual in appearance that it is noticed by every visitor to the area. On the approach of drought the leaves fall off but after the rains the wands are almost immediately clothed again in delicate foliage (page 524).

In early spring the bare stems are tipped with scarlet flowers so brilliant in color that comparatively few on the side of a mountain will tint the whole landscape.

ENTERING A FOREST WONDERLAND

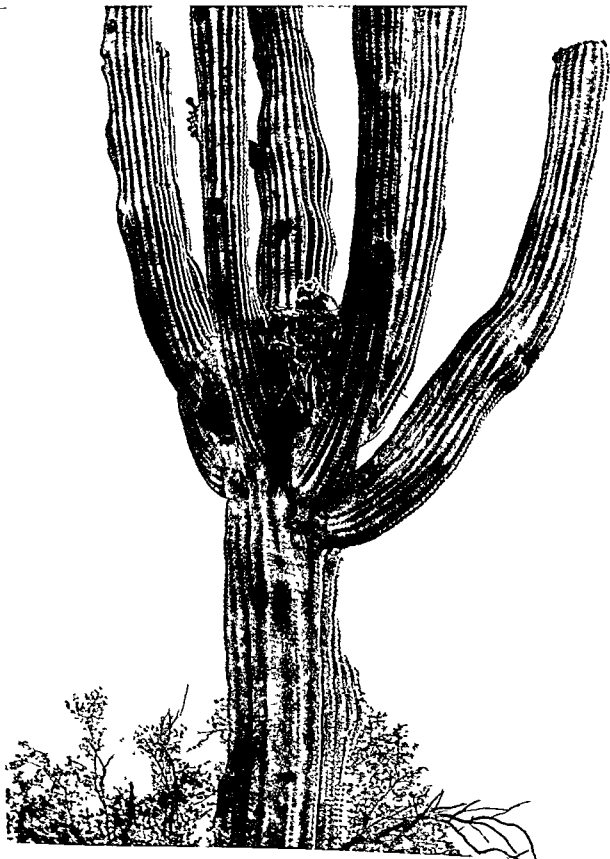
We had entered the Saguaro National Monument near the south gate and passed first by an old claim shack the owner of which first acquired the right to the land.

The few scattered mesquites, creosote bushes and many of the yellow composites, paloverde, cholla and *ocotillo* we had seen had not prepared us for the sudden change just ahead.

Crossing a low ridge we entered at once the foreground of the saguaro forest. Like the front rank of an advancing column these mammoth plants stood out as an indication of what lay beyond the crest of the low hill ahead. From this crest the strange forms rose as far as we could see scattered almost equally over the hills and flatlands and extending far up the mountainside.

Far to the north and east the trunks stood out sharply with their lighter green against the deeper green of the paloverde and mesquite. The prevailing color of the entire area was green, the mesquite an olive green, the saguaro a light olive, the tip of every great stem almost white with its cottony areoles and spines.

Passing on across a dry sandy wash lined with mesquite and paloverde and acacia and climbing the next ridge through an avenue of saguaro columns we saw a never ending variety of forms no two exactly alike. Yet the pattern of development is very simple.



Photograph by H. L. Shantz

AS IF CLUTCHED IN A GIANT'S HAND, A GREAT HORNED OWL NESTS IN THIS SAGUARO

Flickers and other woodpeckers have drilled holes in the fluted fingers for their homes but tiny elf owls now occupy some of them. President Hoover established the Saguaro National Monument, about 15 miles east of Tucson, Arizona, on March 1 1933. It comprises 60 000 acres of hilly, arid land more than a half mile above sea level. Spanish Conquistadores 81 years before the Pilgrim Fathers landed at Plymouth, discovered the giant cacti and named them.

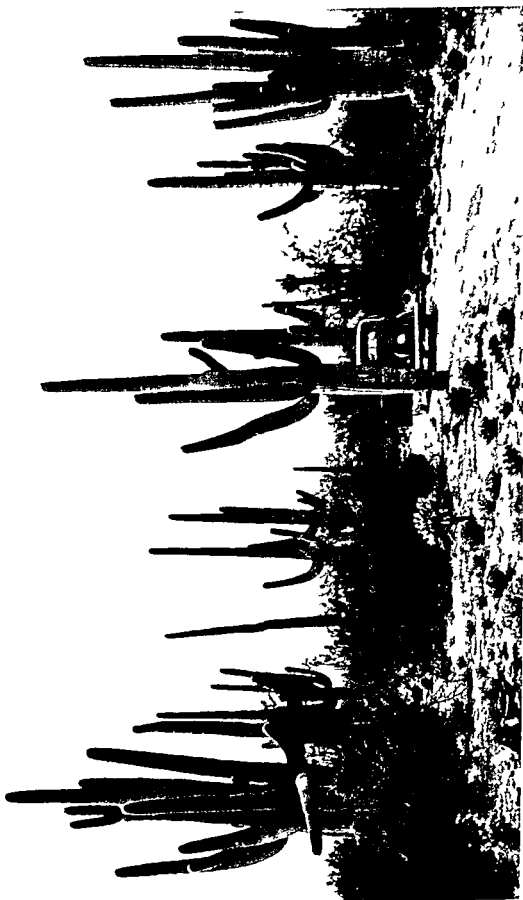


Photo courtesy of C. West Gray

FOOD AND SHELTER FOR THE INDIANS WERE THE STATELY SAGUAROS TALLEST OF DESERT PLANTS

R d men made drink and ne from the fru t and pounded the sh ny black se ds into flour This fashioned ribs for their huts from tough woody stran is found in le the ma n trunk (page 537) When a fire is k ndled at the base of one of these giant cacti flames race over the tiny dry q nus Warriors of the Papago tribe burned the plants as s fruits at n ght



WHEN LQUESTHILINNES RIDE THROUGH THE FOREST AT DAWN OR DUSK, THORNY TRAILS APPEAR LINED WITH WEIRD GHOSTS

Since moisture is scarce, saguaros grow only an inch or two a year. Unlike true trees, they have no rings from which their age can be exactly determined. Some of them undoubtedly have lived 250 years or more. Indians brewed a bitter tea from bushy greasewood, here seen in clumps among the cacti.



Photograph by H. L. Shantz

FLOWERY "LIGHTS" TIP CANDLEWOOD WANDS IN THE SPRING

So brilliant are the red spikes of the ocotillo that a few bushes scattered over a hillside make it appear carpeted with flowers. Other names given the willowy plant which is not a cactus are coachwhip and Jacob's staff. Tiny leaves and thorns cover the branches (page 520)



Photograph by Gilbert Grosvenor

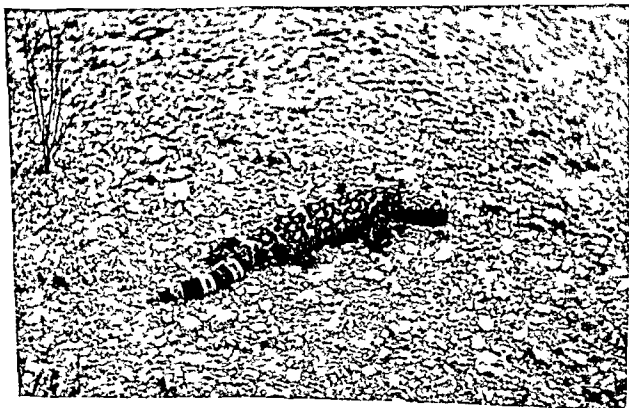
WATER FOR THIRSTY TRAVELERS IS STORED UNDER THESE LONG BARBED SPINES

To tap the barrel cactus or bisnaga cut off the top and expose the white porous pulp. Soon beads of clear water ooze to the surface. Bisnaga pulp boiled in sirup becomes cactus candy.



FEW ENEMIES CAN REACH THIS BABY THRASHER SAFE BEHIND A BARBED WIRE FENCE

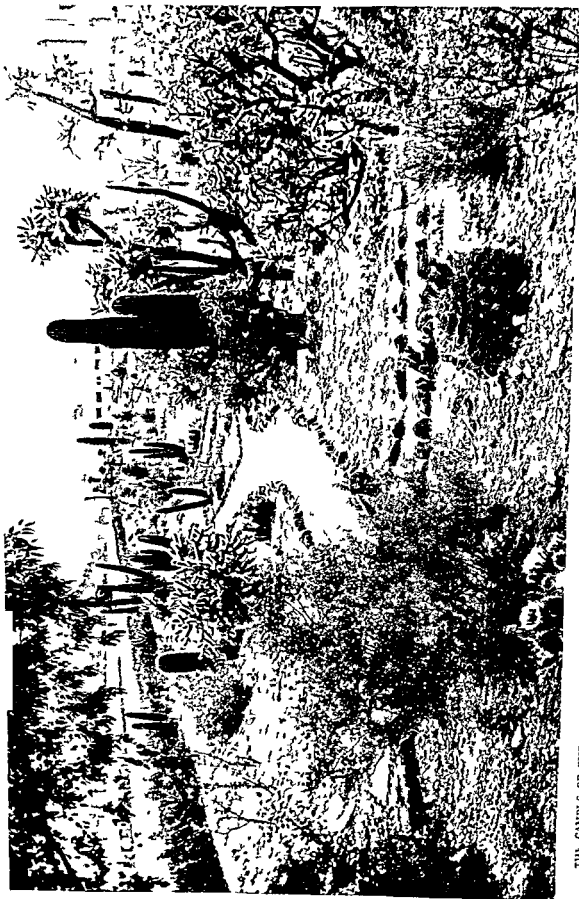
A camouflaging coat makes the bird hard to see and vicious spines of the *Opuntia* thicket discourage pursuit. Greenish yellow berries visible here often hang intact for several years. One desert denizen the pack rat fortifies its doorway with the joints of this cholla (page 531)



Photographs by H. L. Shantz

THE GILA MONSTER MAY BE SLOW TO ANGER BUT IT HAS A BULLDOG GRIP

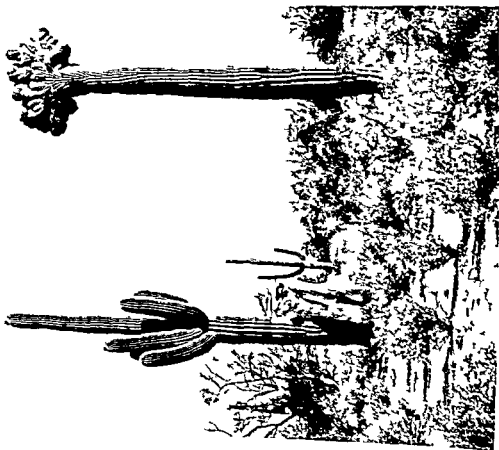
Though the beady black and-orange reptile has no fangs, poison flows from its lower jaw like saliva and works into the wound along grooved teeth. Naturalists believe that the plump tail is a reservoir of fat.



Photograph by H. L. Shantz

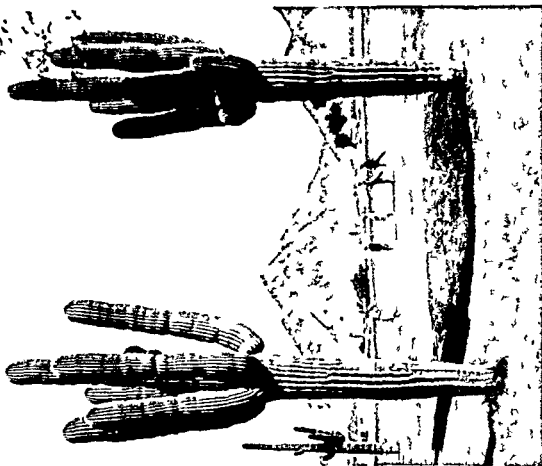
THE CAMPUS OF THE UNIVERSITY OF ARIZONA HAS A CACTUS GARDEN WHERE PLANTS OF THE DESERT THRIVE UNDER CULTIVATION

Students sauntering along these paths see specimens of nearly every plant that grows in the region. Hedichog cactus blooms in the left foreground and just beyond the path near the center and to the right are other chollas. A young barrel cactus grows in the right foreground. A thick saguaro stands next to



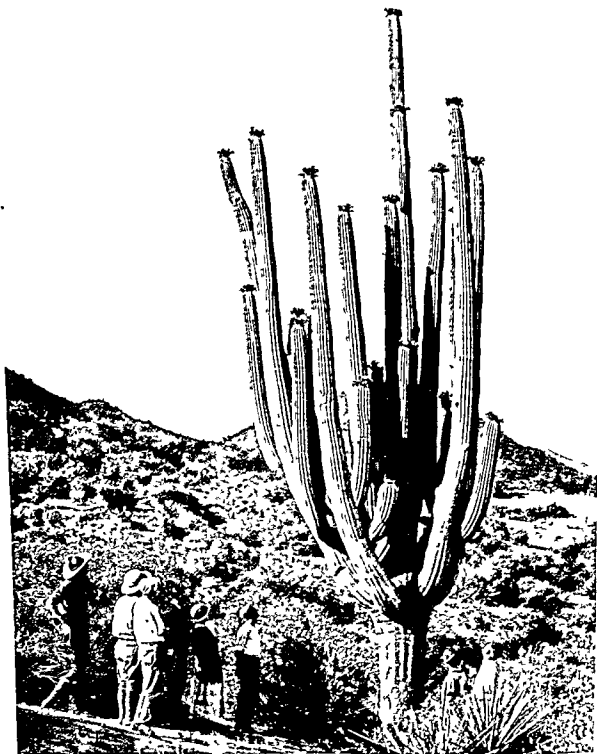
LIGHTNING MAY HAVE PRODUCED THIS CACTUS LAR

Injury of some kind when the saguaro was young, caused its growth to grow in the unusual shape. Another deformed cactus is called the fan.



CACTI ARE TRIP HAZARDS ON A DESERT COLF COURSE

Coyotes dogs that have learned to stalk (page 29) sometimes rowl over the links at Phoenix Ruggie Squaw Creek rices in the background



Photograph from Southern Pacific

WHITE BLOSSOMS TIP THE FINGERS OF THIS SAGUARO ALONG THE OLD APACHE TRAIL

What appears to be a single mammoth flower on each branch is actually a cluster of many blossoms. Plants generally bloom in April or May, and the cucumber shaped fruit ripens about midsummer (page 531). A "sapling" cactus has a single trunk. When this grows to about 20 feet buds appear halfway up its sides. These knobs first grow out at right angles to the main column and then turn upward or hang down in curiously contorted positions to form branches 10 to 15 feet long (page 522). A fascination of the Arizona desert is the endless variation in the branching of the saguaros. The above specimen is a familiar form.

Columns rise from 18 to 20 feet in height then from the sides a little more than half the way up buds push out to form the branches. These branches are constructed a little where they leave the stem but come out always at right angles. They soon bend upward and vary from mere buds to large trunks 10 to 15 feet long and up to a foot and a half in diameter.

Next we passed through a luxuriant botanical garden marked by *Opuntia mesquite*, *acacias* and *Baccharis*. In a wash we saw a desert willow, one of the attractive trees of the Southwest. Desert gourds may be found either on the ground or in the trees together with the wild tobacco and *Verbesina*.

WANDERING IN A DREAM FOREST

Again we climbed a steep ridge through columns of giant saguaro and came out upon a plain studded with an unusually fine group. The stand is as dense as that of an ordinary yellow pine forest and the variation from plant to plant far greater. Here are plants with arms twisted in curious fashion, others standing as lone columns and still others clustered in close groups.

Not the least interesting are the skeletons of old saguaros from which all the cortex has been weathered away leaving only a riblike trunk. At the bases the ribs have grown together into a woody structure but higher up these bundles separate and form long woody rods. These will stand for years if not cut down or destroyed by campers or woodcutters (page 519).

After leaving this wonderland and passing again through a luxuriant wash and botanical garden we climbed a hill marked with the silvery foliage of *Encelia* and beheld from the top one of the most interesting views in the whole area. Here the cacti stood so close together that we saw only a mass of saguaros. In the foreground their light olive trunks were clear cut against the rich green of the paloverde and mesquite.

Probably the best time to get the full significance of the area is in the afternoon when the setting sun lights these trunks and brings out every plant within the range of the eye. A veritable thicket of saguaros rises north and east and even south and trunks can be distinguished standing far up against the mountain.

We went on and on feeling that each view was better than the one before. On one side of us four great trunks formed al-

most a single plant and on the other was a mass of a dozen or more in a single square rod. There were odd fasciated forms, forms twisted by unfavorable environmental conditions, forms with grotesque arms and irregular ribs.

A WILD CREATURES PARADISE

As we left the hills and crossed a plain studded thickly with saguaros we heard the voice of a coyote, that dog that has learned to howl. He was standing on a ridge, venting his resentment of our presence. An ample supply of California and antelope jack rabbits, banner-tailed chipmunks and spermophiles supplied him with abundant food.

We saw the fresh track of the Mexican mule deer, a beautiful large animal which occupies the lower desert area while the more abundant and more wary Arizona white-tail ranges farther up on the Rincon slopes. A small herd of mule deer from the overstocked Kaibab National Forest had been liberated here and a spotted fawn we saw may have been an offspring of this herd for they apparently feel at home.

The desert bobcat, tall, tawny, alert, a foe of Gambel's quail, the Mexican cougar or mountain lion and even the rare but more interesting jaguar with its rich coat of dots and circles and the smaller ocelot have been found here.

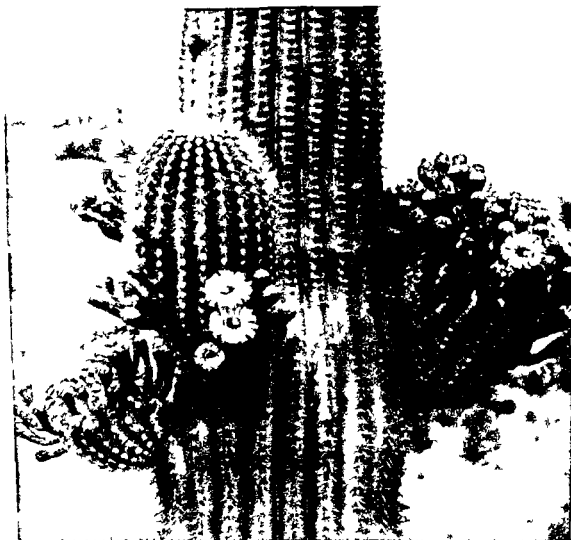
From a high ridge we watched a band of peccaries working their way from bush to bush, rooting out the grubs from cactus plants, the larger leading almost like a band of baboons in the African semi-desert. Because of favorable feeding grounds and breeding conditions this area is a population center for the peccary in Arizona.

Two foxes, the desert gray and the kit fox, are trapped for fur.

Birds are everywhere and we were at once attracted by the unusual environment and the use our feathered friends have made of the saguaro plants.

Of all the birds found in the area the most closely associated is the gilded flicker, since its range practically coincides with that of the giant cactus. It is responsible for most of the nest cavities drilled into the trunks and branches of the older cactus plants.

The Gila woodpecker must of necessity limit its distribution to regions where there are trees in which it may hollow out nesting places. Below the oak belt and above the



Photograph from Southern Pacific

SAGUARO TRUNKS GROW FAT AND FULL DURING WARM SPRING RAINS

Sometimes they absorb so much water that they split down the sides. In summer, when moisture is scarce, trunks contract and the fluted ridges close up like an accordion bellows. Flowers usually occur at the tips of branches, but here they crop out on the sides.

cottonwood lined bottomlands the easily penetrable saguaro furnishes the proper nesting places. The birds quickly pick out the soft pulp when the tree is in its natural state, but the saguaro soon coats the opening with a corky layer so hard and resistant that when the whole plant dies this protective patchwork weathers out and remains for years.

Near the base the strands of wood, or xylem, are united to form a perforated trunk, but near the top they are separated and stand up like parallel whips when the pulp rots away. The woodpecker often cuts these off and the plant develops detour channels to carry the water around the break.

The tiny elf owl, a pygmy of this large family of birds, will reward a stay in the forest until sundown. Nesting in the saguaro stems, it sounds its plaintive call just at sundown. The elf owl seems to be almost entirely dependent upon the saguaro and its woodpecker fauna for its home at least within the range of the giant cactus.*

The purple martin and the lovely little desert sparrow hawk, which does not live on sparrows but mostly on grasshoppers, also use the ready-made woodpecker nest sites. The latter bird is unknown in the

* See "Shadowy Birds of the Night" by Alexander Wetmore, NATIONAL GEOGRAPHIC MAGAZINE, February 1933.

hot sun baked man made nest boxes in the Southwest but finds a home to its liking, in the cooler nests sunk deep in the watery pulp of the giant saguaro.

Other birds of more casual or accidental relationship to the saguaro are some of the larger hawks especially the western red tail which often uses large branched specimens as nest supports, the western horned owl which sometimes takes over the hawk's nests, the cactus wren which occasionally places its bulky retort shaped nest in the crotches, and even the road runner which has been known to nest in saguaro stumps. The white-winged dove feeds largely on the pulp and black seeds of the fruit.*

The daylight bird of most interest is probably the road runner so named because in the days of horse travel it would often run for a mile or so ahead of a good team. The automobile has forced it to give up this habit.

Reared in a nest on the ground road runners feed mostly on grasshoppers and lizards. Anyone fortunate enough to see one of them catch a lizard is entertained by a most interesting performance. Pleased no end with itself the bird dances about, ruffles its feathers and swishes its tail up and down. It seems to appreciate attention and does not run away at one's approach.†

GAMBEL'S QUAIL AT HOME

Gambel's quail abundant throughout the Southwest nests on the ground or rarely in a cholla or desert bush. Early and late these birds may be seen feeding in small coveys or during and following the mating season in pairs with or without the brood.

Some little fellows of this species almost too small to be seen scurried to cover on our approach. A lone cock sitting on a bush proclaimed to the world that he had found no mate and sang of his loneliness.

We saw the cactus wren with its nest in the cholla, the saw v phainopepla always flying about and many doves. In summer the large western white-winged dove feeds on the fruits of the saguaro as do the western mourning dove and the small Mexican ground dove, the last named distinguished sharply from the turtledove by its handsome brown wings.

* See Game Birds of Prairie Forest and Tundra by Alexander Wetmore NATIONAL GEOGRAPHIC MAGAZINE October 1936.

† See Parrots, Kingfishers and Fishcatchers by Alexander Wetmore NATIONAL GEOGRAPHIC MAGAZINE June 1936.

Just after a rain or early in the morning or late in the evening, when the sun is not too bright, there may be seen some of the more characteristic reptiles such as the red racer, a snake so swift that it can be caught only with the greatest difficulty. The black tailed diamond rattler is a rather large and handsome snake which usually gives warning when anyone approaches.

Another desert creature, the Gila monster is about a foot and a half long beautifully colored in black and orange. Though it appears very slow and clumsy, it is capable of rapid movement. It feeds largely on birds' eggs (page 525).

Often in the area one sees the large black spider, the tarantula, which comes out chiefly at night.

Developers of the park hope to keep it as a natural area in which animals of every type will be protected. Chipmunks dart across the road with tails held at angles, and the little gray spermophile stops at the entrance to its hole to salute the visitor with a quick jerk of its tail before it dives in.

One interesting animal will probably not be seen, although its home is visible everywhere. The pack rat builds up big piles of cactus joints and other material at the bases of plants storing there quantities of food and making hiding places. The creature is so thoroughly protected from its enemies that the coyote, the bobcat or even the skunk or peccary would hesitate to disturb it in its retreat.

The desert turtle, a rich deep brown with lighter brown markings on the top and bottom of its shell, is found throughout the Southwest. Specimens range in size up to almost a foot across. They feed mostly on cacti and other desert vegetation.

The desert is everywhere alive with interest, and here the entomologist will find a large and fascinating field. Even the ants have conspired to make the region interesting by building up their little piles of dirt and the termites plaster over the base of the saguaro so that they may feed on the corky layer without subjecting their transparent bodies to the light.

During April and May, after the saguaro has reached eight to twelve feet, it produces flowers in profusion near the tips of the branches, the topmost buds usually opening last. These large white or slightly creamy flowers, two to three inches across, crown the massive trunk and give way to a mass of fruits which break open at the top.



Photograph by H. L. Shantz

CREAMY WHITE SAGUARO FLOWERS ARE DISTANTLY RELATED TO THE ROSE

Funnel shaped blooms which tip the arms of the giant cactus bear a resemblance to their relative (page 530). One flower has been sliced through its center (left) to show the arrangement of the petals hairlike stamens and long stigma. The ovary filled with numerous ovules lies at the bottom of the deep throat. The smooth and waxy sepals or coverings of the unopened buds at the sides of the picture are olive green edged with yellowish brown.

and split down, exposing a carmine pulp.

In this stage the fruits color the landscape and look like irregular flowers being in many ways more interesting than the flowers themselves.

The fruit of the saguaro with its pulp of brilliant carmine color and hundreds of small black seeds furnishes excellent food for birds and man. The Papago Indians gather these fruits for dried sweetmeats, jams and jellies and the pulp is in taste comparable to that of the best watermelons.

THE SAGUARO IS A SLOW GROWER

These great monarchs start only from seed and hidden away under a piloverde or a Lycium or a mesquite pass the first four to six years out of sight. Thus they are protected from trampling by grazing animals before they reach the diameter of a lime or small orange. Then they stretch and at 15 or 25 or possibly 35 years are baby saguaros.

The Saguaro National Monument con-

tains 99 square miles. It includes the highest peaks of the Rincon Mountains and extends down to the desert on the south and west. A bench mark at the northwest corner where the north gate road enters the forest registers an altitude of 2,649 feet. The saguaros extend up to about 4,500 feet and the top of the mountain reaches 8,500 feet.

The northwest part comprising 15 square miles owned by the University of Arizona and private individuals covers the best part of the forest. This portion has been fenced by the Civilian Conservation Corps.

The saguaros are easily destroyed. A bullet wound or the stab of a knife may kill the plant whereas a larger cut may readily cork over (page 530). A grass fire, a match applied to the spines, any slight hurt may destroy the beauty of the saguaro. Therefore it is the hope of those interested in nature and especially in the luxuriant desert types that the region will be held as a natural area protected and kept for science and for future generations.

VOLUME LXXI

NUMBER FIVE

THE NATIONAL GEOGRAPHIC MAGAZINE

MAY, 1937



TWENTY FOUR PAGES OF ILLUSTRATIONS IN FULL COLOR

By Sail Across Europe

With 39 Illustrations

MERLIN MINSHALL

Butterfly Travelers

C B WILLIAMS

Nomads Among the Butterflies

3 Paintings and 5 Natural Color Photographs

H MURAYAMA and W R CULVER

The Isle of Man

With 14 Illustrations

F H MELLOR

Sunny Corners in a Friendly Isle

12 Natural Color Photographs

B ANTHONY STEWART

Along London's Coronation Route

With 22 Illustrations and Map

MAYNARD OWEN WILLIAMS

A Mexican Land of Lakes and Lacquers

22 Illustrations HELENE FISCHER and LUIS MARQUEZ

Bekonscot, England's Toy-Size Town

With 2 Illustrations

ANDREW H BROWN

Tableaux in an English Lilliput

15 Natural Color Photographs

B ANTHONY STEWART

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
WASHINGTON, D.C.

\$3.50 A YEAR

50c THE COPY

NATIONAL GEOGRAPHIC SOCIETY

GEOGRAPHIC ADMINISTRATION BUILDINGS

SIXTEENTH AND M STREETS NORTHWEST, WASHINGTON, D. C.

GILBERT GROSVENOR, President
ROBERT V. FLEMING, Treasurer
HERBERT A. POOLE, Assistant Treasurer
LYMAN J. BRIGGS, Chairman

JOHN OLIVER LA GORCE, Vice President
GEORGE W. HUTCHISON, Secretary
THOMAS W. McKENNA, Assistant Secretary
ALEXANDER WETMORE, Vice Chairman, Committee on Research

EXECUTIVE STAFF OF THE NATIONAL GEOGRAPHIC MAGAZINE

GILBERT GROSVENOR, EDITOR

JOHN OLIVER LA GORCE, Associate Editor

J. R. HILDEBRAND
Assistant Editor
MELVILLE BELL GROSVENOR
Assistant Editor
McFALL KERBEY
Chief of School Service
LEO A. BORAH
Editorial Staff

FREDERICK SIMPICH
Assistant Editor
ALBERT H. BUMSTEAD
Chief Cartographer
E. JOHN LONG
Editorial Staff

FRANKLIN L. FISHER
Chief Illustrations Division
MAYNARD OWEN WILLIAMS
Chief Foreign Editorial Staff
CHARLES MARTIN
Chief Photographic Laboratory
LEONARD C. ROY
Editorial Staff

BOARD OF TRUSTEES

ROBERT V. FLEMING
President and Chairman of the
Board, Riggs National Bank

WALTER S. GIFFORD
President American Telephone and
Telegraph Co.

DAVID FAIRCHILD
Special Agricultural Explorer U. S.
Department of Agriculture

C. HART MERRIAM
Member National Academy of
Sciences

LYMAN J. BRIGGS
Director National Bureau of
Standards

GEORGE R. PUTNAM
Commissioner of Lighthouses
Retired

THEODORE W. NOYES
Editor of The Evening Star

GEORGE W. HUTCHISON
Secretary National Geographic
Society

CHARLES EVANS HUGHES
Chief Justice of the United States

WILLIAM V. PRATT
Rear Admiral U. S. Navy, Retired

RAYMOND S. PATTON
Rear Admiral, Director U. S. Coast
and Geodetic Survey

ALEXANDER WETMORE
Assistant Secretary Smithsonian
Institution

GILBERT GROSVENOR
Editor of National Geographic
Magazine

J. HOWARD GORE
Prof. Emeritus Mathematics The
George Washington University

ELISHA HANSON
Lawyer and Naturalist

JOHN J. PERSHING
General of the Armies of the
United States

GEORGE OTIS SMITH
Formerly Director U. S. Geological
Survey

O. H. TITTMANN
Formerly Superintendent U. S.
Coast and Geodetic Survey

JOHN OLIVER LA GORCE
Associate Editor of the National
Geographic Magazine

CHARLES G. DAWES
Formerly Vice President of the
United States

GEORGE SHIRAS, Jr.
Formerly Member U. S. Con-
gress, Faunal Naturalist and
Wild Game Photographer

OSCAR WESTOVER
Major General Chief U. S. Army
Air Corps

CHARLES F. KETTERING
President General Motors Research
Corporation

ORGANIZED FOR THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE

To carry out the purposes for which it was founded forty nine years ago the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material which The Magazine can use generous remuneration is made. Contributions should be accompanied by addressed return envelope and postage.

Immediately after the terrific eruption of the world's largest crater Mt. Katmai in Alaska a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—The Valley of Ten Thousand Smokes, a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

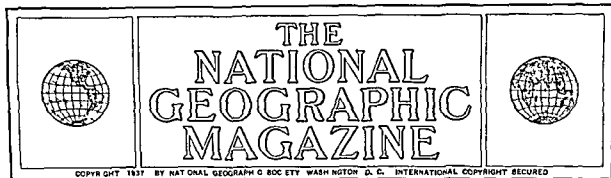
The Society cooperated with Dr. William Beebe in a deep-sea exploration of undersea life off Bermuda during which a world record depth of 3,078 feet was attained August 15, 1934 enabling observations of hitherto unknown submarine creatures.

The Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary who discovered the North Pole and contributed \$100,000 to Admiral Byrd's Antarctic Expeditions.

The Society granted \$25,000 and in addition \$75,000 was given by individual members to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

The Society's notable expeditions to New Mexico have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region, The Society's researches have solved secrets that have puzzled historians for three hundred years. The Society is sponsoring an ornithological survey of Venezuela.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to an officially recognized altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments and obtained results of extraordinary value.



BY SAIL ACROSS EUROPE

By MERLIN MINSHALL

MORE than eleven hundred years ago, in the reign of the Emperor Charlemagne, the plan was first evolved of making a canal that would link the two great rivers of Europe, the Rhine and the Danube. Technical troubles were encountered, and it was almost the middle of the nineteenth century before the canal was finished. That was in the reign of Ludwig I, King of Bavaria, so in honor of him it was called the Ludwigs Canal.

However, the canal never became the economic and strategic factor that was intended. It was far too shallow, the locks were too small. Its eastern and western outlets were not easily navigable at any season. And it came into being at the wrong time—a time when the railways had just about monopolized all the profitable trade (page 550).

What might have become a key water way of Europe almost immediately fell into disuse. Thus a canal that makes possible a fresh water journey across the Continent, from the Atlantic to the Black Sea, today is almost unknown (map, pages 536-7).

A HONEYMOON BY SAIL

In January, 1932, I was planning a sailing honeymoon. I already had the boat—a 10-ton Dutch cutter called *Hawke*, famous many years before as the fastest *boeier* (pleasure boat) of its class in Holland. For inland sailing it would have been almost impossible to find a more suitable craft. A Dutch *boeier* is in many ways remarkable. It sails extremely fast, in spite of its bluff bows and broad beam, and as close to the wind as anything else of its size. Its draft

is around three feet, its accommodation is enormous (page 534).

Hawke was only 27 feet on the water line, yet four could sleep aboard comfortably, and when we finally set off we carried a full size bath, a cooking range, fireplaces, refrigerator, storage for about a month's supplies, clothes for a year, an extensive library, and a large white bull terrier. And we weren't crowded!

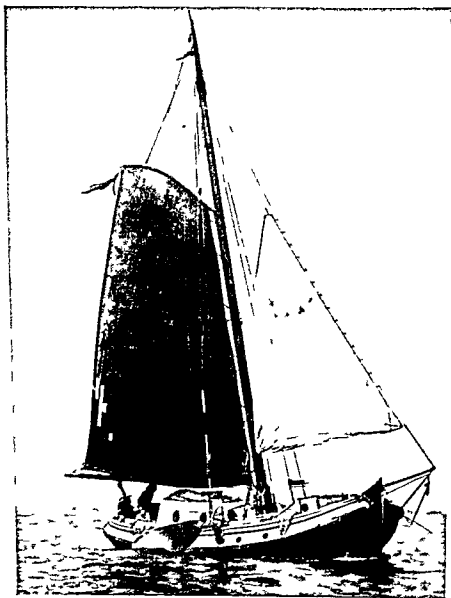
As auxiliary to her thousand square feet of sail she had a small motor that gave us about three and a half knots in still water.

At first "Crew" and I were not quite decided where to go. Through the Netherlands and up to Copenhagen, or down through France to the Riviera? Then, one day Crew came across a queer little book published in 1853, full of early Victorian engravings, describing a voyage from the Rhine to the Danube "by way of the Ludwigs Canal."

OFF FOR THE "LOST WATERWAY"

We both became very excited about this, and decided to make the "Lost Waterway" of Europe our first objective. In August, intending to reach the Rhine by way of France, we set sail from Southampton for Le Havre.

The history of this port, second largest in France, goes back to the sixteenth century, when King Francis I, of France, chose Le Havre as the port of Paris. Within a few years, however, it became English, when the Huguenots delivered it over to Queen Elizabeth. But it was shortly recaptured by Charles IX and his mother, Catherine de Medici.



OUTWARD BOUND ON A HONEYMOON CRUISE ACROSS EUROPE

Astern is England, whence the author and his bride sailed on their transcontinental voyage. *Hawke* their 10-ton Dutch cutter was a fast sailer despite the bluff bows and broad beam that made her comfortable and roomy. On canals where sails were useless an auxiliary motor gave her a speed of three and a half knots. The boat's shallow draft made navigation of the canals comparatively easy. When sailing to windward in deep water her big wooden "fin" or leeboards one on each side could be lowered to keep her from "sliding off" sideways.

A hundred years later the great military engineer Vauban finally fortified it so that subsequent English bombardments were of little avail, and Le Havre grew rapidly into its present importance. Economically it is the front door to Paris. Because it is virtually on the open sea, Le Havre, unlike Liverpool up the Mersey, or Philadelphia up the Delaware, has not had a constant battle to fight as the draft of steam-

ships increased.

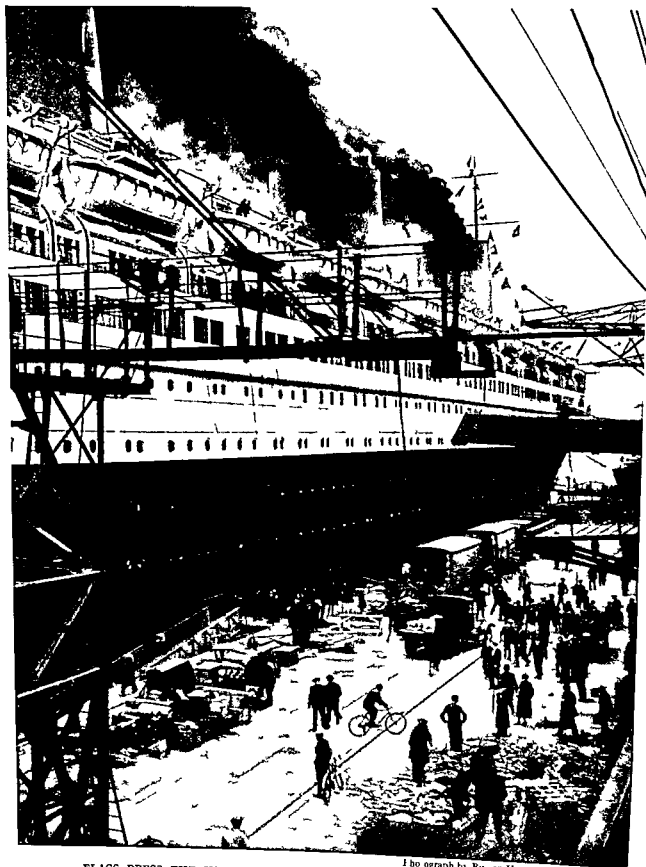
Into this mighty port *Hawke* sailed after a crossing of 18 hours. Having furled sail and scrubbed down in the outer harbor, cautiously we nosed our way under power into the inner port.

It did not take long to discover that our best friends were going to be our nearest neighbors—the bargemen, who right from the start treated us as one of themselves, and who, by their readily offered help, were to save us from many an awkward fix.

Soon we began picking up their argot, and by the time we had reached Paris we could differentiate exactly between "berichon" and "margota" and knew what was a "peniche" and what was a "chaland"—all of which to the uninitiated, are just barges. But we found that our lack of nautical jargon made no difference in our relations with these cheery water folk.

ROUEN, OFFICIALLY, ON THE SEA

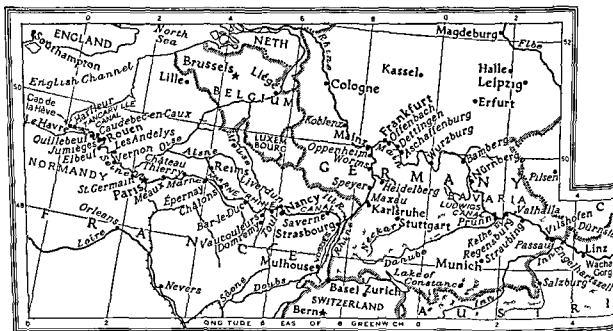
As the sea goes officially right up to Rouen, we had no formalities in Le Havre. So when we had explored the amazing labyrinth of quays, visited everything from transatlantic liners to fishing smacks and seen the unforgettable view from Cap



FLAGS DRESS THE HUGE NORMANDIE AT HER NEW DOCK IN LE HAVRE

Photograph by Burton Holmes from Galloway

This is the 83,422 ton transatlantic liner's home port. It took the author 18 hours to sail *Hauke* across the English Channel from Southampton to Le Havre where he tied up among friendly bargemen in the bustling inner harbor. Entering the Seine here the little ship was not to see open water again until she reached the Black Sea on the other side of Europe.



THROUGH EIGHT COUNTRIES 'HAWKE'S' ADVENTUROUS COURSE

Few yachtsmen have ever navigated the whole of this chain of waterways stretching approximately as far as from New York to Salt Lake City. Starting at Southampton *Hawke* sailed across the English Channel and up the Seine to Paris. The Marne Rhine Canal took her over the Vosges Mountains to the Rhine. Following the Main River and old Ludwigs Canal she reached the Danube at Kelheim then cruised with the historic stream southeastward to Sulina on the Black Sea.

de la Heve, where stands the most powerful lighthouse on the coasts of France, we left our mooring in the Bassin de la Barre and picked our way through a seething crowd of shipping. There were Swedish timber boats, American oil tankers, freight ships of every flag, all jostled together and all very busy loading or unloading.

Soon we left behind the noise and bustle of Le Havre. Harfleur, that 'miniature Rotterdam, miniature Venice' glided past, while high above us stood the tower of St. Martin's, built by the English King Henry V when Harfleur was the chief port of Normandy and England ruled half of France. Then we sailed out into open fields, and by way of the Tancarville Canal reached the Seine just below Quillebeuf.

Once out on the Seine there was no stopping, as we were caught on a strong flood tide. That evening we succeeded in anchoring beside the lights of a small village and the next morning we woke up in Caudebec en Caux. It was three days before Crew and I could tear ourselves from the little half timbered streets. Then, on the fourth day, we felt we must visit the near by ruins of the Abbey of Jumièges that unique seventh century gem founded by Saint Philibert.

Upon returning, we found *Hawke* right out in midstream. In our absence the mascaret, dread tidal wave of the Seine, had come, and our three-inch hawsers had snapped like cobwebs. A ledge anchor thrown overboard quite by chance had prevented a disaster.

THE CITY OF LA SALLE AND JOAN OF ARC

Next day we arrived in Rouen, the ancient capital of Normandy. But the harbor, one of the busiest in France, turned out to be no place for a small boat (page 539). For two days we were almost continuously on the move, being bumped and pushed by pleasure boats and barges, and so had little time to enjoy the sights of a town so prolific in antiquities that it has been described as the 'Ville Musée.'

Not a corner in this "Museum City" but breathes some piece of history. Here is the birthplace of Cornelle, of La Salle, the explorer of the Mississippi of Flaubert, and here, perhaps most celebrated of all, took place the glorious tragedy that ended the exploits of Saint Joan of Arc.*

* See "Normandy: Choice of the Vikings" by Helen Churchill Candee, NATIONAL GEOGRAPHIC MAGAZINE, May, 1936.

All this had to be for us little more than a background to customs formalities, and we were hardly sorry to escape into the country and begin our journey toward Paris.

The Seine with its ceaseless traffic might well be called the main artery of Normandy, now that its navigation has been simplified by enormous locks.

Often, however, we left the main stream and wandered up little side channels, past large country mansions, past Elbeuf, past

was the way to see Europe. But then, when we were ready to go on, floods came, and it was another week before we could even hope to make headway against that tearing current.

At last we set off, but it was only to get stuck in the difficult Branche de la Monnaie where the river, between high banks, streams right under the gargoyles of Notre Dame. We had to be rescued by a rather indignant police boat.



Les Andelys where towering above the winding river stands the imposing mass of Chateau Gaillard, built in the twelfth century by the English King Richard the Lion Heart (page 538).

Soon after passing Vernon, chosen by Anatole France as the typical Little Town of France, we came to St Germain and explored that exquisite relic of Napoleon: the palace of Malmaison. Although the Eiffel Tower was already in plain view we had still a long way to Paris.

ANCHORED OFF THE LOUVRE

Mile followed mile of dreary tenements and factories. Then came a lovely contrast when we passed by the Bois de Boulogne and then all at once we were in the heart of Paris itself.

Under the very shadow of the Louvre we anchored and spent a happy three weeks with no touch of hotel life. This we said

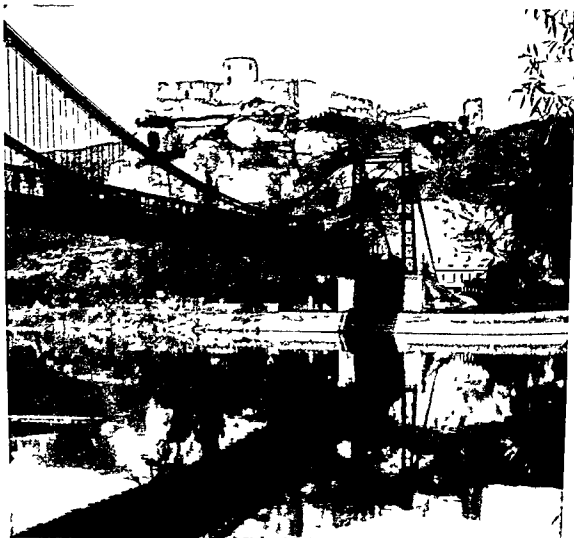
A few miles above Paris we left the Seine and turned aside up the Marne River, where our struggles continued all the way to the bishopric of Meaux and on to Chateau Thierry, where the splendid American War Memorial dominates the landscape (page 543).*

As soon as the river reached the champagne country we entered the Marne-Rhine Canal which was to take us 240 miles across France, over the Vosges Mountains and down to the Rhine.

We spent a day in Épernay exploring the champagne factory with its labyrinth of cellars and underground galleries.

At Chalons we found the canal in the throes of a traffic jam as this is the big junction for all the traffic going north to Belgium and the Netherlands.

* See Our National War Memorials in Europe by General John J. Pershing NATIONAL GEOGRAPHIC MAGAZINE January 1934



Photograph by Burton Holmes from Galloway

RICHARD COEUR DE LION'S "SALCY CASTLE" FROWNS ON A MODERN SEINE BRIDGE

England's crusader king built the rock based fortress at Les Andelys in 1196 to defend his Norman possessions against Philip Augustus of France. Walls of the keep are 12 feet thick. As strong as Chateau Gaillard became a popular byword but after Richard's death his enemy captured the castle by starving out the garrison in a six month siege. Beneath this bridge a constant stream of boat traffic passes up and down the Seine.

The countryside now became more interesting, and we sailed peacefully on past Bar-le-Duc and into the Joan of Arc country, for the canal here passes close beside Vaucouleurs and Domremy, where the house of the Maid of Orleans has become an important shrine of pilgrimage.

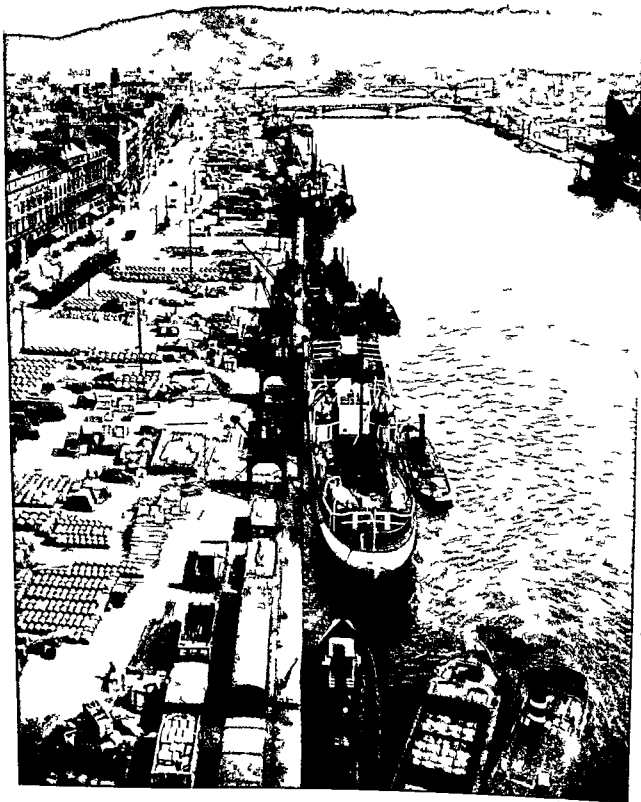
BARGE MET HEAD-ON IN A TUNNEL

On Christmas Day we arrived in Toul, one of three famous bishoprics that once held the key to northeastern France.

Then we came to Liverdun. Here the canal passes right under the town. Having been assured that all was in order, into

the tunnel's mouth we plunged. In inky blackness we were groping our way, when suddenly out of the gloom appeared a rapidly moving motor barge. Now it is one thing to argue with a French barge in broad daylight; it is quite otherwise in a pitch black tunnel where the smaller boat is very much at a disadvantage.

Our only hope lay in getting *Hawke* backwards out of the tunnel in split seconds. Her 40-foot mast, strapped down horizontally, caught in the roof; the engine began spluttering; the reverse gear jammed, and the tiller got completely tied up with the dinghy.



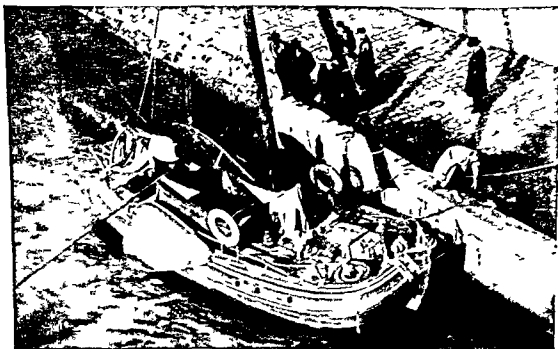
ROUEN WHERE JOAN OF ARC DIED IS ONE OF FRANCE'S BUSIEST PORTS THOUGH 80 MILES
BY RIVER FROM THE ENGLISH CHANNEL © R. Rasmus

Casks of imported oil form an irregular pattern on the quay along the Seine where a trim freighter from Stockholm loads cotton textiles and other products of Normandy's ancient capital. During the World War British troops and goods for the front were transhipped here in such numbers that docks were congested for miles on both shores. No place for a small boat is Rouen's crowded harbor, writes the author.



"HAWKE" DIPS HER 40-FOOT MAST TO PASS BENEATH A BRIDGE

Near Vernon on the Seine the author's bride—the "Crew" of the vessel—shows how the mast is lashed down its top projecting far beyond the stern. Later on the Danube the spar struck and pulled down telegraph wires which Dr. Minshall failed to see in time (page 561).



Photographs © Meritt Minshall

FLYING THE BRITISH ENSIGN, "HAWKE" WAS THE AUTHOR'S SEINE SIDE HOTEL

Strollers along the embankments in Paris often see yachts from England and other countries moored to the quays. *Hawke* lay nearly a month in the shadow of the Louvre. Probably few Parisians had ever seen a Dutch *loei*er before. Thousands of barges and small steamers ply to and fro in the capital which handles more tons of cargo than any other French port.



Photograph by Maynard Owen Williams

NOTRE DAME ON ILE DE LA CITE WATCHES OVER THE OLDEST SECTION OF PARIS

The French capital began life as a port and its grand boulevard then was the Seine. When the Romans conquered the city, a settlement of the Gallic tribe of the Parisii dwelt on the island which divides the river. Then it became a strategic crossroads of Roman trade routes.

Somehow we arrived at the far end of the tunnel with a whole ship, but with wholly shattered nerves.

By the time we reached Nancy, ice already was forming on the canal and it was a race to get over the summit of the pass before the water froze solid. So we didn't dare to dawdle more than one day to revel in the varied splendors of that delightful town with its wealth of lovely ironwork, its ducal residences, its 15th century church. But we did take note and also a good supply of the chief specialty, the celebrated macaroons.

Each day now the cold grew worse and we had to break the ice to get a passage. Then one night came a drop in temperature

and we were stuck completely. It was thoroughly bad management, to get caught in such a desolate spot, but there was one consolation—we did get six weeks of excellent skating.

Our biggest problem was food, as the nearest town was more than twelve miles away, and we were soon reduced to baking our own bread and haggling with a farmer for such odd scraps of produce as he could spare.

ICE BREAKER RELEASES MAROONED COUPLE

But one day the ice-breaker appeared, crashing its way with the help of eight horses and soon we had left behind this desolate region and reached the summit.



HAWKE WAITS HER TURN IN ONE WAY TRAFFIC

© Merrill Hall

A broad beamed barge emerges from the tunnel where the Marne Rhine Canal flows beside the railroad. Locks carry the waterway over the Vosges Mountains here and drop it down to the Rhine. In one of the dark tunnels Hawke met a barge coming head on and had to retreat astern. While the ship was frozen in for six weeks on this canal Skipper and Crew enjoyed excellent

The eastern face of the Vosges is almost sheer, and the canal here has to perform queer maneuvers to get down to the level of the Rhine.

In places there was only room for two barges abreast between the locks and delays were frequent. At last we came down into the foothills, and passing through the old fortress town of Saverne, reached Strasbourg.

Here Crew and I decided very definitely to make up for the rigors of the last two months. So in Strasbourg we stayed three

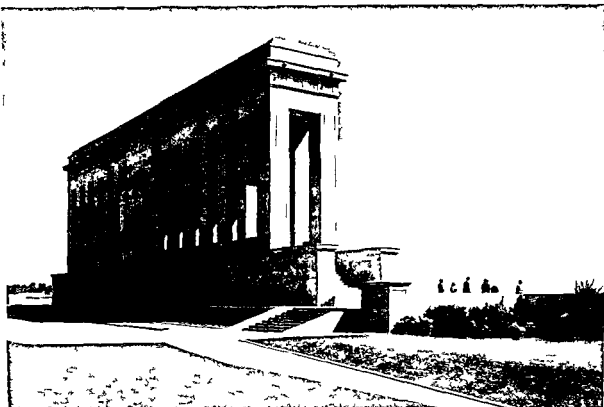
barges in tow up to half a mile long, often gave us anxious moments when under full sail we encountered them in a narrow part of the river.

PASSING UNDER WATCHFUL FORTS

The first stretch of river after Strasbourg perhaps is the most jealously guarded piece of water in Europe. Our every movement was carefully watched from the little forts that line either side of the way, but we arrived uneventfully at Maxau, across the German frontier, where trouble was saved

weeks reveling in the Gothic splendors of one of the finest cathedrals in Europe and visiting a dozen little medieval houses, now turned into museums of Alsatian art. Here we vied with each other in ferreting out new restaurants, of which Strasbourg has so many.

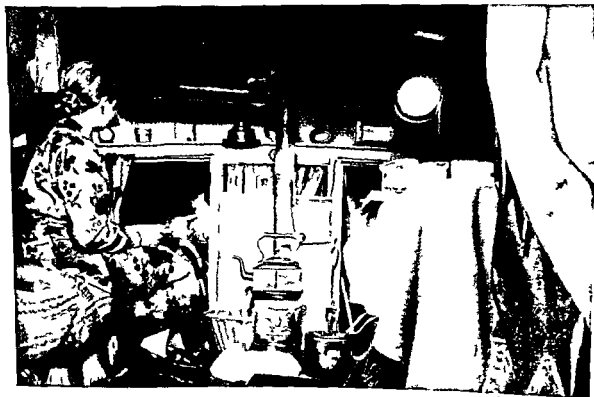
Before setting out on the Rhine we received grave warnings of the dangers of sand banks and pin-point bridges and the advice of more than one aged skipper was that we take a pilot. We decided against this, however, and discovered almost at once that the greatest danger to us was the traffic. The farther north we went the thicker it became. French, German, Belgian, Dutch, and Swiss tugs, huge, unwieldy looking paddle wheel affairs, with a string of



The photograph by W. Robert Moore

CHATEAU THIERRY'S STATELY MEMORIAL HONORS AMERICANS WHO FOUGHT HERE

Two heroic figures symbolizing France and the United States stand shoulder to shoulder on the front of the impressive monument erected by the United States Government in 1930. Above them are inscribed the names of battles that raged in this vicinity in 1918 (page 537)



CREW SURVEYS THE BRIDAL SUITE

© Merl A. Marshall

The cozy cabin had several bunks, cupboards for books, clothes, and supplies, and a stove with a square teakettle. Also carried aboard the little craft were a full size bath, cooking range, refrigerator, and a bull terrier!



Photograph by Donald McLeish

HOME OF THE "HOT DOG" IS SAUSAGE-LOVING FRANKFURT

The city's famed namesakes—linked frankfurters of beef and pork, highly seasoned and well smoked—are sold at this shop in the Old Market, along with other sausages of varied sizes, shapes, and colors. American style hot dogs, in rolls are liked in Germany. Wienerwurst, named for Wien (Vienna), has shorter and more slender links than frankfurters.

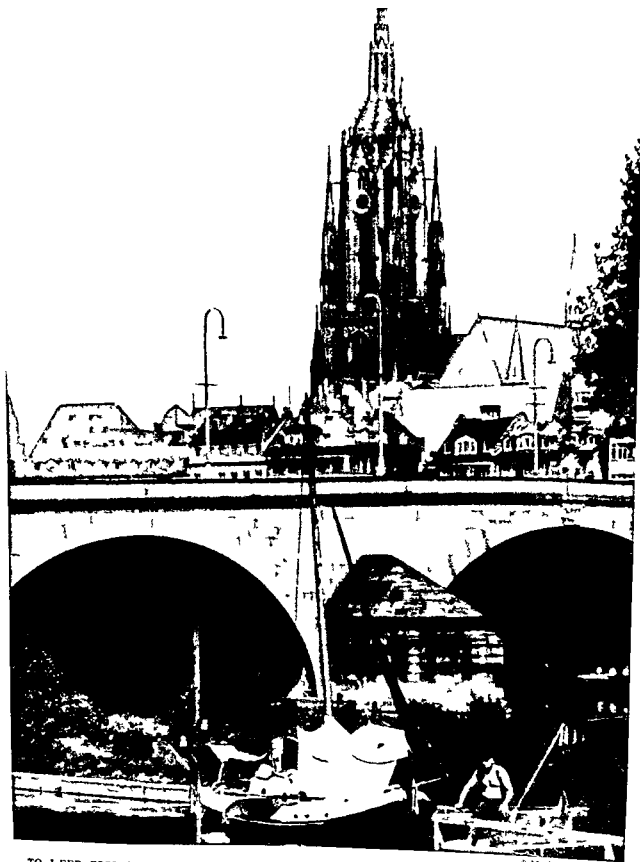
by a smart customs boat, flying an enormous swastika, which came alongside while we were still under way. All the formalities were gone through without our even having to slow down.

And so we came to Speyer, where, in 1529, the name of 'Protestant' originated, and where a fine Romanesque cathedral so towers above its surroundings that mere man seems dwarfed by comparison. The town gave us the feeling of a lost and lovely oasis of repose.

Here we made a slight side tack, by leaving the Rhine and its traffic and sailing up the Neckar to Heidelberg. We came away with mixed impressions of castles, duels, rain, and Grecian nectar which we drank while *Hawke* became the honored guest of the rowing and sailing clubs.

WORMS, AND A WINE

Once more hurrying down the Rhine, we made our first stop at Worms, where some 400 years ago Martin Luther dramatically



TO KEEP COOL IN OLD FRANKFURT THE AUTHOR RIGGED A TENT ON HAWKES DECK © Me In M n hall

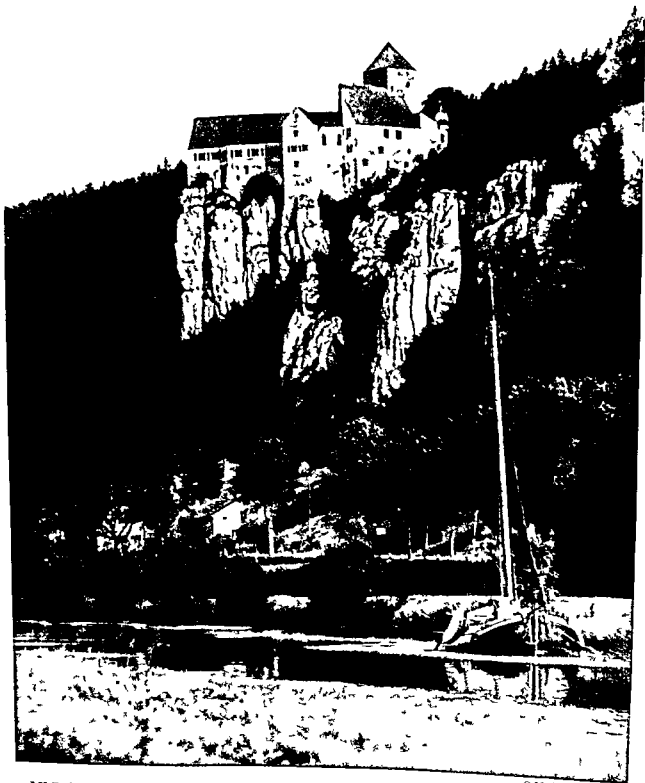
"Ford of the Franks" (Franconofurd) was the city's original name. Here Charlemagne and his soldiers crossed the Main River, where nowadays citizens of the busy metropolis swim and sun themselves on bathing pavilions. Across the stream towers the red sandstone Cathedral, begun in 1352 and not completed until 1881.



Photograph by Paul Wolff

TUGS AND BARGES MADE SAILING TRICKY WHERE HAWKE TURNED UP THE MAIN

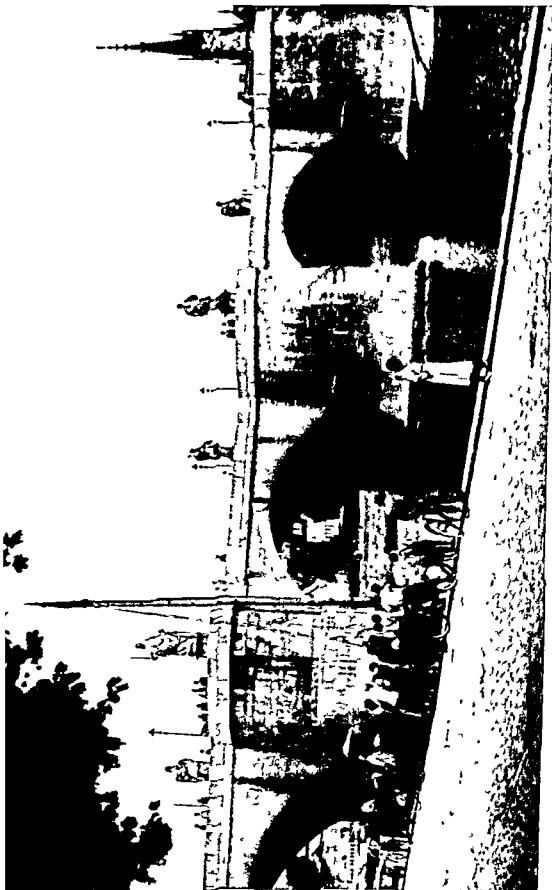
Steeple and domes piercing the sky mark Mainz once called the Golden City because of the wealth it accumulated in the Middle Ages. Roman Emperor Diocletian spanned the Rhine with a bridge just above its confluence here with the Main. Today Mainz is the headquarters of the Rhenish wine trade.



© Merle M. Marshall

LIKE A FAIRY PRINCE'S CASTLE IS SCHLOSS PRUNN, WITH LUDWIGS CANAL AS THE MOAT

High above *Hauke*, its sheer walls seem a continuation of the sharp promontory (page 553). For small rocky building sites such as this, medieval architects developed a many-storied fortress home with a restricted inner courtyard. Bavaria's green hills bristle with scores of romantic castles.



© Martin Vinshall

CURIOUS WÜRZBURGERS GATHER BESIDE THE MAIN TO LOOK AT THE LITTLE SHIP FROM FAR-OFF ENGLAND

A concrete sluice under the bridge forces most of the river into a swift stream. After work, daring youths plunge into this current, shoot under the structure, and drift into the slower water below. Twelve huge statues of saints line the bridge, which was under construction when Columbus discovered America. The author arrived here in time for the festival in honor of St. Kilian, an Irish missionary who was martyred at Würzburg in 689 (page 553)

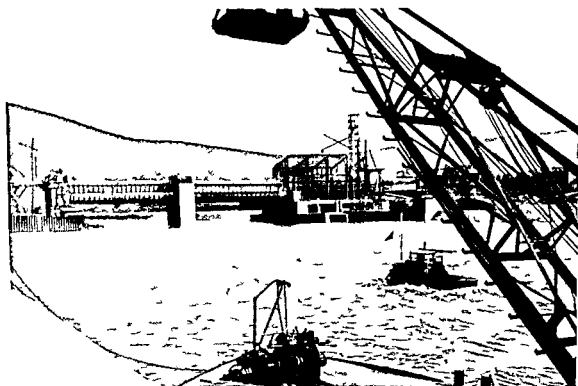


ABOVE ASCHAFENBURG'S MODERN HARBOR THE MAIN BECOMES SWIFT AND NAVIGATION DIFFICULT

In part of the river a heavy chain is laid on the bottom for the *Kettenschiff*. This strange tug has a mechanical chain gang which grasps the links and hauls the boat up

against the strong current. *Hauke* was given a tow by the craft (page 352)

Photograph by Lewing Galloway



MODERN ENGINEERS DIG THE CANAL THAT CHARLEMAGNE DREAMED OF

Construction of a Rhine-Danube waterway proved too big a job for the Emperor of the West who died in 814. Traces of the work he attempted may still be seen. King Ludwig I of Bavaria joined the two rivers in 1846, but his canal was too small to compete with the growing railroad.



Photograph—Mabel Marshall

MUSICIAN'S BOAT HAWKS AS SHE ENTERS THE FIRST LOCK IN LUDWIG'S CANAL

The "hitchhiker's" serene Skipper and Crew, to pay for a ride as deck passengers. Little used today and weed-grown in places, the old canal carries vessels over the Bavarian mountains, reaching at its highest point more than 1,500 feet above the sea. On the "sail among the clouds," the author and his wife, standing on deck, looked down on villages far below and far away, castles on distant crags.

defied the Emperor Charles V. Today there stands a striking memorial to the reformer. Not far away is the Liebfrauen Kirche which has given the name of 'Liebfraumilch' to the famous wine of which a tenth part is grown in the small vineyard that lies around the church.

After Worms he gains the vineyard district of the Rhine.

The hills on either side become precipitous with steep stepped little terraces where every inch is scrupulously cultivated while here and there castles appear. Our last night on the Rhine was spent at the foot of the castle of Oppenheim which gives its name to another brand of hock.

On the whole however we found the Rhine altogether too congested for pleasant sailing. As soon as Mainz showed up on our port bow we put the helm over and setting an easterly course up the Main River began the long climb up to the Ludwigs Canal.

With little difficulty we reached Frankfurt where we received a rousing welcome. Here we were entertained royally and *Haacke* once again aroused interest. We found the town a place of striking contrasts. On the one hand is the most daring modern architecture and then almost across the way is seen the little Alt Stadt (Old Town) that has remained almost unchanged for 400 years (pages 544 and 545).

Every morning saw us wandering through the narrow crooked streets and taking our lunch in the open market place which claims to be the original home of the hot



© Melvin Hall

NEVER A SAILING SHIP HAD HE SEEN BEFORE. HAWKE CAME

Most of this wrinkled Bavarian's life has been spent in the quiet mountains near Ludwigs Canal where he tills a small farm and contentedly smokes his enormous pipe.

At night we used to roam along the same dimly lit alleyways—Rapunzel Gasse and the Romerberg where around every corner we expected to see lurking the shadowy figures of goblins and witches, emperors and men at arms.

HAWKE STRANDED IN A CORNFIELD

But we had a long and arduous climb before us as we discovered soon after leaving Frankfurt. Slowly we struggled past Offenbach where Goethe visited Lili and on toward the field of Dettingen the last place where an English monarch, George II, led his troops on the battlefield.



© Merlin Minshall

"GRAF ZEPPELIN" SOARS OVTR NURNBERG AS NAZIS SALUTE REICHSFUHRER HITLER

Down a steep narrow street past sedate gabled houses bedecked with red swastika banners citizens hurry to watch legions of brown shirts from all over Germany parade before the Realm-leader. Once an important distributing point on the medieval trade route between Germany and the East, Nurnberg owes her modern prosperity to manufactures, including toys and lead pencils.

Just before Aschaffenburg we anchored one night, and woke up with the dismal sight of *Hawke* standing high and dry in a cornfield. Such was the caprice of the river floods. It took two tugs and many marks to drag us back into the narrow channel, but that night we anchored in deep water under the frowning castle of art-loving Ludwig I of Bavaria.

From the lofty windows of the royal bedroom is visible the Pompeianum, built by Ludwig, a reproduction of the house of Castor and Pollux at Pompeii.

At Aschaffenburg begins a great project for making a new fresh water link through to the Danube, an undertaking which has

already cost the Government many millions of marks.

After a few days we set off again, but what appeared to be a gentle stream was in reality a millrace.

TOWED BY A "CHAIN BOAT"

After no more than ten miles we had to drop anchor and await the passing of the *Kettenschiff* (chain boat), an antique tug that worked itself up on a continuous chain all the way from Aschaffenburg to Bamberg.

This strange-looking craft progressed in cable-car fashion, clanking and grumbling as it swallowed and disgorged the rusty

links of a chain nearly two hundred miles long. Barges and other boats hutchhiked behind.

So began for us a pleasantly lazy period in tow when all day long Crew lay back basking in the sun watching the beauties of the landscape unroll their changing colors.

At times the river wound through deep wooded gorges at others through a rolling farmland in which little fruit trees stood among the variegated plots of rye barley and tobacco. We passed medieval villages and little walled towns that look today much as they must have appeared to Albrecht Dürer when the artist made his famous journey by boat down to the Netherlands more than 400 years ago.

PEASANTS AND FLOODLIGHTS

At Würzburg we left our tug and punted once more to explore. This little baroque town offers more to the traveler than most places of its size. There was the Residenz with its famous cellars, the towering castle above the town and Veitshöchheim that unique residence of the guest of the old prince bishops of Europe.

Our arrival coincided with the annual fair the feast of St. Kilian Würzburg's patron saint. So we had the good fortune to see the whole town specially floodlighted the bridges festooned with colored lights and everywhere the neighboring peasants clad in their native costumes (page 548).

But once again when we were ready to leave the river rose perversely in flood and the Kettenschiff service had to be suspended. Fortunately for us when we were just despairing of ever reaching Bamberg a large Diesel tug appeared and behind its convoy of barges we hooked on. Customs of the Middle Ages still prevail among these river folk and after the second day it no longer surprised us to hear a rifle rung nor to be awakened by the ship's bell ringing matins.

Here the river went through an arid stretch of steeply stepped vineyards. We passed many more villages with blue and gold Madonnas gazing placidly from under baroque canopies across the rushing stream. One evening the four towers of Bamberg's mighty cathedral loomed ahead and by sunset Crew and I knew for certain that the Last Waterway of Europe really did exist.

We found too that it actually was pos-

sible to go through so now having reached the canal we were determined to reach the Danube as well.

A week was spent in formalities and during this time we had leisure to explore what must surely be the sleepiest town in western Europe. Just because it happens not to be on a main route Bamberg has never been spoiled and yet it can truly boast some of the finest medieval sculptures in all Germany. For sheer loveliness the old Episcopal Residence the Alte Hofhaltung, has few rivals.

In Bamberg it would have been easy to while away pleasant months but we still had a long way to climb to the summit of the Bavarian highlands. So one day there was a great stir in the quiet old city for the unusual was happening—a ship was passing into the Ludwigs Canal! (P. 550.)

Then unexpectedly along the deserted banks we suddenly found ourselves in the heart of Nurnberg where the Reichsparteitag the foremost Nazi festival was in full swing (opposite page).

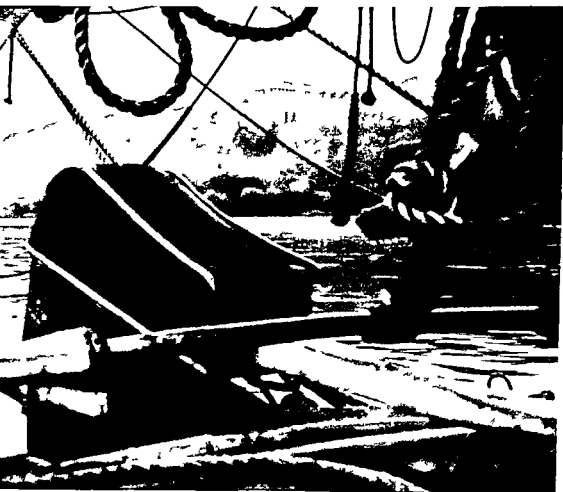
It was unforgettable seeing this venerable town transformed by flags banners and myriad brown shirts into a gigantic military parade noting the wild enthusiasm as each day Herr Hitler drove through the streets in state to address some mass meeting. Every night the entire town was illuminated by fireworks displays and torchlight marches while ceaselessly day and night droned overhead the might of Germany's air squadrons.

It was almost impossible to visit the many antiquities and so we went on our way having but improperly observed one of the most interesting towns in central Europe with its Meistersingers its castle and the all pervading spirit of the immortal Dürer.

EUROPE LAY AT OUR FEET

After Nurnberg the canal begins climbing steeply through thickly wooded hills and as we rose higher there came the strange sensation of looking down from *Hawke's* decks upon the roofs of little villages far below us with fairy tale castles away on the distant hills until one day we had reached the summit and found ourselves under full sail right among the clouds. Europe lay at our feet.

Soon we were descending rapidly through a pleasant countryside and came unexpectedly upon the gigantic fortress of Prunn celebrated as a resting place of the



† Merlin St a hall

HIGH OVER THE DANUBE LUDWIG I BUILT VALHALLA FOR GERMAN HEROES

Seen over *Hawke's* rudderstock the Bavarian monarch's marble Hall of Fame resembles the Parthenon at Athens. Ludwig, who had a passion for erecting monumental buildings as well as the canal dedicated this columned temple near Regensburg in 1842. A terraced flight of steps leads up to it from the river.

Nibelungen (page 547). Then we reached Kelheim where the Danube comes out from its narrow gorge showing us a river that might be beautiful, but certainly was not blue.

AFLOAT, WITH THE HELP OF FARMERS

Once again we had the usual controversy with the river authorities about taking a pilot, but obstinate as ever, we set off alone and within two miles had run hard aground in midstream. We were saved the ignominy of returning for help by the kindness of twelve young Bavarian farmers who swam out to our rescue. In half an hour we were afloat and rushing toward the first real danger spot, the famous bridge of Ratisbon (Regensburg).

The impassability of this bridge dates

back to the time when medieval Venice was at the height of her prosperity. To prevent a Rhine-Danube waterway from being constructed that city's agents saw to it that the bridge obstructed navigation. Venice could not afford to lose her monopoly of the overland caravan routes!

As skipper I took the precaution of making a trial trip in a small skiff but this did not allay our anxiety. However there was nothing for it but to hope for the best and with hardly an inch to spare *Hawke* squeezed through at an estimated 12 knots, to the wonder and amazement of the inhabitants of Regensburg.

VALHALLA FOR GERMANY'S GREAT

Next as we went flashing through the pine forests, was Valhalla, another creation



Photograph by R. Zacharias

ENGLAND'S KING ALFRED IS HONORED AMONG FAMED TEUTONS IN VALHALLA

Ludwig himself chose the celebrities who were to be enshrined under the gilded ceiling. Among the 108 marble busts are those of the philosopher Kant and Emperor William I. Bismarck and Von Moltke were added later, as was the seated statue of Ludwig, at the end of the mosaic floor.



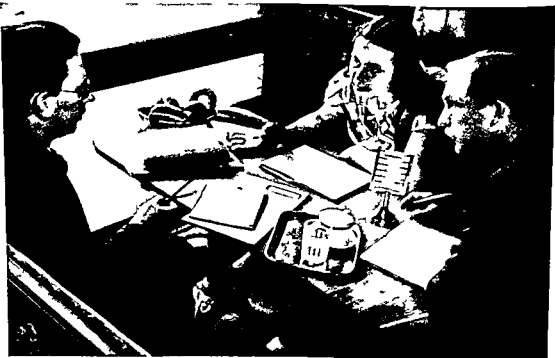
© Melvin Marshall

SKIPPER AND CREW TAKE LIFE EASY WHILE BEING TOWED UP THE MAIN
Browned by many weeks before the mast, they lounge on deck and watch medieval villages, wooded
gorges, tiny farms and terraced vineyards roll by along the river.



GOOD-BYE AND THANK YOU FOR THE SHOW!

At the end of the performances each child in turn says good bye to the puppet clown. In Austria and Germany the Punch character of the familiar Punch and Judy plays is known as Kasper.



Photographs by Kurt and Margot Lubin

ENGLISH LESSONS STEADY EASIER IF TAKEN WITH ROLLS AND COFFEE

Instead of receiving pupils at home this private teacher invites them to a cafe to practice pronunciation. Vienna's taste for coffee dates back 254 years when the Turks driven from the city after the famous siege of 1683 left behind a supply of the beans.



IN SMART SAILOR UNIFORMS, VIENNA'S BOY CHOIR TOURED THE UNITED STATES

In 1935 and 1936, 21 members of the *Sängerknaben* (singing boys) sang in New York, Washington, and other American cities. Here they give an open air choral in their native land.



VIENNA POLICE SWING ONTO THEIR 'WHEELS WITH MILITARY PRECISION

Trained like soldiers, they know how to use rifles, tear gas, and even machine guns in emergencies. Horses, motorcycles, and armored cars are also their mounts. Recently the force, numbering about 10,000 men, was equipped with steel helmets.

Photographs by Kurt and Margot Lubanski



A RICH ROYAL BARON, FEAR OF THE FORST, ONCE COMMANDED AGOSTIN CASTLE

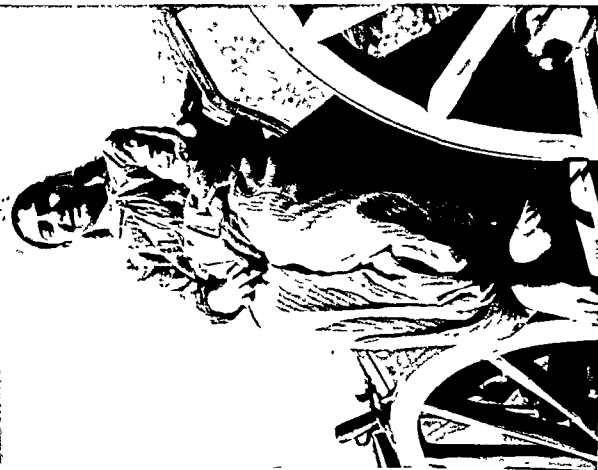
1h 1 graphy He ar ch Schu von

Into his rise garden a leap all in the mountainside this legendary figure hurled his victims. A young prisoner finally escaped returned with his men and captured the castle. The Baron was hung to a beam in the hall where he had been feasting and the rose garden was planted with the robber's chief lieutenant. Only a skeleton of the castle remains today perched 1,200 feet above the Danube flowing through the Wachau Gorge.



11 otograph by I dear S Aldrich

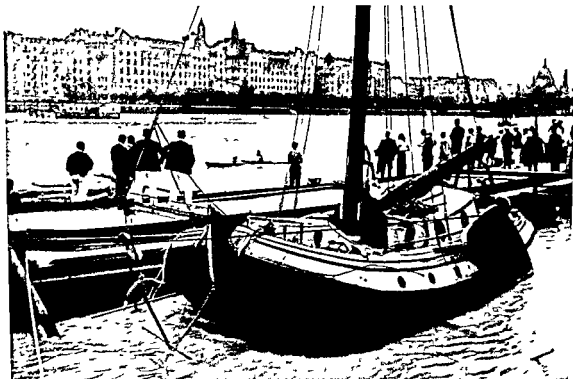
IN DAZZLING APRONS, SERBIAN FARM GIRLS GO TO TOWN
 Costumes of country folk color the streets of Belgrade. Yugoslavians capital on market day. Skipper and Crew were guests of one of the Russian exiles who settled here after the overthrow of the Tsar



© Merlin Marshall

'WANT YOUR FORTUNE TOLD?'

Perched on her painted cart, this young girl is one of the thousands of gypsies that roam the Balkans. A ruler of Romania in 1478 granted her ancestors freedom of air and soil to wander about and free and iron for their smithy



© Merlin M. Nash

BUDAPEST YACHTSMEN GATHER FOR A REGATTA, BUT "HAWKE" DOES NOT RACE!

The little vessel from the other side of Europe received a warm welcome when she nosed into the twin city's lively river traffic, with its scurrying ferries and barges, whose curved prows suggest ancient galleys. Seldom blue, despite Strauss's waltz, the Danube is more apt to be gray, green, or yellow.



Photograph by Erno Yudas

SHADOWY ARCHES FORM A TRIPLE PICTURE OF BUDAPEST'S WATERFRONT

The Danube divides this beautiful capital of Hungary into two parts, Buda and Pest. On the Pest side rises the immense Parliament House, whose long portico becomes a gay outdoor cafe at night.

of the same King Ludwig of Bavaria. Not content with his Pomperium (page 552) he went even further afield erected a full scale reproduction of the Parthenon and filled it with effigies of German's great men (pages 554 and 555).

On we sped past Strubing and drew near to the catract of Vilshofen. But where we expected to find rapids we came upon a broad expanse of water, the result of the new hydro electric station of Kachlet which before long will be transmitting power over a wide area. Into a vast lock *Hauke* crept feeling very much dwarfed and a full 40 feet she sank as the top of her mast came just level with the parapet.

The next minute we were swirling round a rocky promontory, and found ourselves in Passau.

Where the Inn rushes down to meet the Danube there stands a vast rock which makes a strategic site for a town and here has grown up Passau with its little arcaded streets and copper domed half Gothic cathedral so ornate and colorful that it appears somehow as if it had been permanently dipped in Mediterranean sunshine.

We cleared customs and with an escort of soldiers trying to keep up with us along the bank sailed away into Austria.

The Austrian frontier at Engelhartzell is situated just where the river seems to put on speed and it was all we could do to stop even with an indignant customs boat straining to hold us against the current. We underwent a prolonged search not as might be supposed for opium or whisky but for Nazi newspapers of which we unwittingly had a score. Having surrendered these we were allowed to proceed and came down through the steeply wooded hills of the Wachau with its majestic castles and fabled whirlpool.

All this stretch of the Danube is tricky once we nearly came to grief on the rocky promontory of Durnstein where Blondel is said to have discovered his beloved master Richard the Lion Heart imprisoned there on his way back from the Crusades.

A BERTH UNDER A BRIDGE

It was a surprise to find that Vienna lay not on the Danube but had to be approached by a narrow and carefully guarded canal. After the usual tedious formalities we entered this canal and found a berth under the Marien Bridge. Here we stayed for many weeks. It was long since *Hauke*

had been in such pleasant surroundings.

From our deck we could see away up the Rotentum Strasse to St. Stephen's Cathedral while the Ring itself lay just beside us.

It was quite evident now that *Hauke* could not go on this winter—nor, for that matter could she go back. The pack ice on the Danube was something that even *Hauke's* two inch oak timbers had to respect.

So with no very definite plan for the future I returned to England leaving Crew in Vienna for winter sports and *Hauke* for a winter overhaul.

What happened to me during the next eighteen months is no part of this story but I did not return to *Hauke* until the spring of 1935 having in the interval driven cars in international road races designed a hotel seen a little of life and most of Europe. Crew meanwhile had settled down permanently in England.

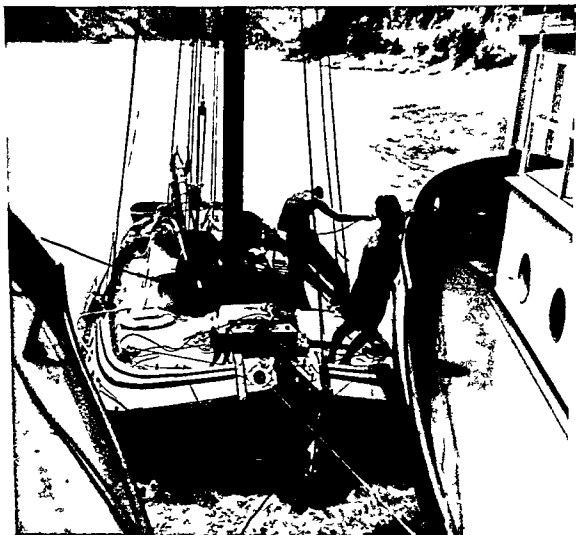
HAWKE RESUMES HER JOURNEY

My return to Vienna was precipitated by a firm intimation from the Austrian Customs that as *Hauke* had stayed more than a year in Austrian territory she was now liable to a duty of 21,390 Austrian shillings—and in 1935 an Austrian shilling was worth nearly 25 cents.

So I had *Hauke* refloated in split seconds (that means about ten days in Austria) and with a scratch crew sailed away from Vienna cleared the customs at Hamburg and set off through the interminable willow swamps for Budapest.

All went well for a few miles and then in the middle of the Czech town of Bratislava under the shadow of the ruined castle of the Empress Maria Theresa we failed to notice some telegraph wires which *Hauke's* 40 foot mast brought down *en bloc*. As *Hauke* had no permit to stop in Czechoslovakia—it was assumed that she would go directly through into Hungary—we hurried on. But fate decreed that we were not to escape that easily for a hidden sand bank caught us and this time even the wind which was blowing half a gale failed to move us.

So the skipper had to return on foot to the scene of our misdeeds to try to get help. But help was not forthcoming and with the water falling hourly, things began to look rather black. Finally the skipper marched more boldly than he felt into the local barracks and put his case before the



© Merion Minshall

SHOOTING THE DANUBE'S IRON GATE IN ROMANIA HAWKE IS ALMOST CRUSHED
BETWEEN TWO BARGES

Made fast to the vessels the author's craft was towed through the dreaded seven knot current where sharp rocks are hidden just below the surface. Soon after the picture was taken the towropes snapped and *Hawke* was left helplessly spinning in the raging stream. Luckily the yacht's small motor started immediately and took her clear of the rocks after a half hour struggle (page 564)

commandant. Luckily this Czech soldier proved to be a sportsman and volunteered to put at *Hawke's* disposal the entire visible Czech Navy—which comprised some 30-foot motor gunboats.

Thus what had appeared a disaster ended happily, for the Czech Navy had *Hawke* floating in less than an hour; no questions were asked about her missing papers and without further trouble we came to the Hungarian frontier at Szob. From there with no more arduous formalities than the affixing of an enormous lead seal *Hawke* arrived in Budapest.

Immediately we became the center of in-

terest and everything was done to make our stay agreeable even to providing a police landing stage and placing two policemen at our disposal. Everybody was more than kind and many weeks were spent in an enjoyable round of dinners, visits to country estates and regattas.

A background for all these pleasant diversions was the city itself offering an enormously rich variety of interest.* There were new foods, new wines, new costumes, and even new dances to study—that is if

* See "Budapest, Twin City of the Danube" by J. R. Hildebrand, NATIONAL GEOGRAPHIC MAGAZINE, June 1932.



© Merle M. Hall

HAWKE'S MAINSAIL IS FURLED AS SHIP HALTS AT A RUINED FORTRESS WHERE SLAV FOUGHT TURK

George Brankovich a Serbian prince built these battlemented walls and square towers more than 500 years ago but they were not strong enough to repel Turkish invaders. From vineyards here at Smederevo on the Danube below the Yugoslav capital Brankovich transplanted vines to his estate at Tokaj in Hungary and from the grapes comes today's celebrated white wine.

one were bold enough to attempt Hungary's wild traditional *csárdás*—while always like a golden thread running through a rich tapestry was the haunting melody of gypsy music.

Before leaving for the descent into the real wilds of the Balkans we picked up two Netherlands journalists the Viennese crew having had to return home. Then we set off toward Yugoslavia.

No sooner had we crossed the border than we noticed an extraordinary change. People and officials alike seemed suspicious of *Hawke*. At Beždan the harbor master refused us permission to pass and we had

no option but to escape at night and hurry on to Belgrade to get the necessary permits through the British Legation.

Belgrade had some of the aspects of an overgrown village. A number of ships were tied up at the port and we were on the point of leaving for lack of room when the commodore of the Russian Yacht Club came to our rescue and made us his guests.

NEARING THE DREAD IRON GATE

All the way down from Budapest the river had offered little of interest beyond a wide expanse of willow swamps with very occasionally a small village but soon after



© Mervin Marshall

PLENTY OF WATER IN THE DANUBE BUT BULGARIANS PREFER IT COOL AND PURE

A long sweep pivoted on the post to the right raises the bucket from the smaller well in the background. The woman with a yoke has just obtained her household water supply. Flowing slowly, sometimes half a mile wide, the river separates Bulgaria from Romania on the opposite shore.

Belgrade we entered Romania and approached the dread Iron Gate. Already the water was so low that it had become dangerous for the regular passenger service and for *Hawke* to keep steerage way in a seven knot current seemed taking rather a big chance.

Engaging a pilot, with the inevitable confusion of languages, was likely to make matters worse, so at Drenkova we waited for one of the big motor tankers that ply between the Romanian oil fields and Vienna. Behind this we tied on and came at breakneck speed into the Kazan Gorge.

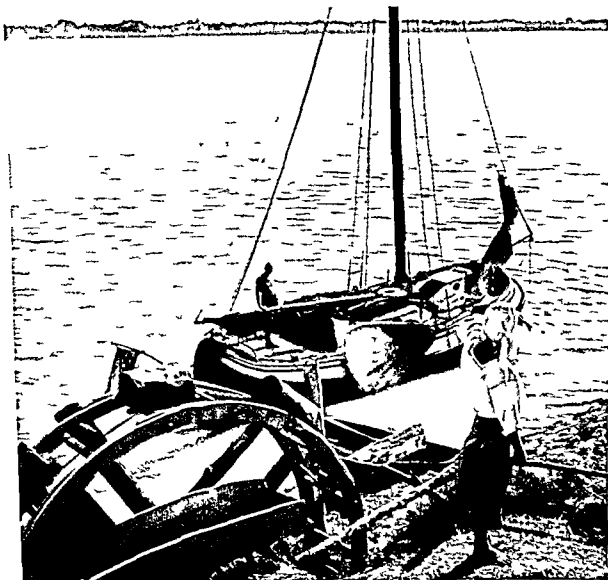
Here the Danube, swift and treacherous, cuts its way between the Balkan Mountains and the Transylvanian Alps, and here, some

2,000 years ago, passed the Emperor Trajan, victorious from his Dacian campaign. Just where the river narrows down, and where the remains of Trajan's bridge still stand, we came near losing *Hawke* altogether (page 562).

TENSE MOMENTS

The strain was too much for suddenly, with the report of a gunshot, one of *Hawke's* oak bollards came in half. Immediately the second towrope snapped, and we were left helplessly spinning in the most dangerous spot on the Danube.

Sails couldn't help us, it was a windless day. Everything depended on the motor. It started at the first swing, but not until



© Melvin M. Hall

HAWKE ANCHORS IN ROMANIA BESIDE AN OLD WATER WHEEL

After the spring floods farmers hurriedly plant corn or wheat in the rich alluvial soil hoping to harvest their crops before the next inundation. About four out of five of King Carol's subjects live by agriculture or stock raising.

Hawke had been swept broadside on against the rocky shore. There followed in agonizing half hour fighting to keep clear of the rocks.

But at last we arrived in the still water beside Turnu Severin and proceeded to anchor for the night.

A SHOT IN THE NIGHT

Just as dusk fell and we were beginning to think our troubles for that day were over two shadowy figures appeared on the shore and demanded that we land immediately. Before the skipper could explain that we were an English boat bearing an international permit for this part of the river there came the rattle of a magazine

and the next moment a bullet buried itself in one of *Hawke's* massive oak leeboards.

Immediately we put out our anchor light and placed a temporary barricade in the cabin. It was clearly no use trying to argue with people whose rifles went off so easily, and so the night was spent wondering when the next shot would hit us.

Next morning while it was still dark the anchor was raised silently and *Hawke* drifted away downstream to the extreme annoyance of the soldiers who only discovered our escape when we were already a speck in the distance.

The same afternoon we arrived at Calafat and reported the events of the previous night to the harbor master. That official



© Merle N. Hall

SHAGGY AS A BEAR A BULGARIAN VISITOR BOARDS HAWKE

His heavy sheepskin cloak contrasts with the brief trunks worn by the bronzed journalist one of the Netherlands whom the author took aboard at Budapest. The bull terrier is now a seasoned yachtsman having cruised all the way from England.

apologized sincerely for the misdeeds of his countrymen and advised us strongly to remain always in midstream to avoid further misunderstanding.

We again set off and as the heat grew worse the current went slower, while all day long there was not so much as a bucketful of wind and we had to chug along on the motor.

These lower reaches of the Danube we found monotonous because the river merely wound through barren swamps. Everything seemed lifeless even the water fowl herons and sad faced pelicans gazed at us immobile as we slid past. The farther east we went the more unusual became the

costumes among the peasants who flocked down to watch us go by. Long baggy trousers yashmaks (veils), and turbans were daily sights and now and then would appear needlelike minarets tokens of a not long distant Turkish rule.

BARTERING CIGARETTES FOR FOOD

Ever since Budapest food had been a problem. After the first few attempts we had given up the idea of eating meat and milk and butter were unobtainable, so we became dependent upon such fruit and vegetables as we could barter for a few cigarettes. Even the finest watermelons and grapes begin to pall in time so that

often, for days at a stretch, we ate little

Then one day around a corner showed up, quite out of place in this desolate region, the once important grain town of Brăila where we paused to rest and lay in provisions for the last lap

Now all difficulties of navigation were past, as the Danube Commission still keeps a 20 foot deep dredged channel for grain ships between Brăila and the Black Sea

From Brăila we sailed down to Galati, where we visited part of the Romanian Navy lying at anchor. Then once again we were out in a flat desolate country side. Passing

Reni and Isaccea we came to Tulcea which with its arcaded bazaars, swarthy turbaned peasants and minarets seemed like a picture right out of the Arabian Nights

Here we left the Danube proper and entered the canal that cuts through the reed strewn lagoons that border the sea shore. Then ahead appeared the three red domes of the Russian church of Sulina, a tall white lighthouse and a limitless expanse of blue waves *

Hauke had sailed across Europe!

At our first sight of the Black Sea we were all so jubilant that we talked of going

* See "The Spell of Romania" by Henrietta Allen Holmes NATIONAL GEOGRAPHIC MAGAZINE April 1914



© Meri a Minshall

SULINA BLACK SEA PORT, IS JOURNEY'S END!

Marking the finish line is the curious Russian church with its three bright red towers crowned by golden crosses. Here Dr Minshall loaded the *Hauke* aboard a cargo steamer and shipped her home to England

on to Istanbul and even to the Mediterranean. But too little food and too many mosquitoes had given us all a good case of malaria so such ideas had to be abandoned. I found an English wheat ship loading up and for a few pounds the captain undertook to ship *Hauke* home.

The little craft had done remarkably well. Few boats would have stood up under the brutal treatment she had received during those three years of intermittent voyaging. She had withstood ice and sub-tropical sunshine, unkind rocks and unfriendly sandbanks. Built away back in 1876 she was now in her sixtieth year and well deserved an honorable retirement.

BUTTERFLY TRAVELERS

Some Varieties Migrate Thousands of Miles

BY C. B. WILLIAMS

Chief Entomologist Rothamsted Experimental Station Harpenden England

MANY people believe that all butterflies live but a few days and that they keep quite close to the local air where they hatched from a chrysalis. This is true of most species but there are others which live for weeks sometimes for months and instead of fluttering around they may set off in a definite direction and fly some hundreds or even thousands of miles from their birthplace before settling down to lay their eggs.

This habit of changing location or migration, has been known to occur in birds and locusts since ancient times and has been suspected for about a century in the butterflies and moths. The Cotton Worm Moth of the southern United States (Plate VI figure 10) was one of the first in North America to come under suspicion. Today the habit is also known among some dragon flies and beetles particularly the ladybirds and more rarely in other groups of insects.

The butterflies may migrate singly or in large numbers. Lights estimated to contain more than a thousand million individuals have been recorded. The sight of one of these butterfly movements the insects passing for hours and even days steadily pressing on in one direction is an event in the life of any naturalist.*

EVIDENCE LIKE A JIGSAW PUZZLE

By piecing together scattered and incomplete information much as one might try to fit together a jigsaw puzzle of which most of the pieces have been lost we begin in a few cases to have some idea of the extent of the movements of where the butterflies start what route they take and where they come to rest.

By far the best known of the migrants is the Monarch or Milkweed Butterfly (*Danaus plexippus*, Plate IV). This magnificent insect has its headquarters in North America and has spread chiefly in historic times to the Cape Verde Islands

and Madeira in the Atlantic and to most of the islands of the Pacific. It is said to have reached New Zealand about 1840 and appeared in Australia about 1870. In both of those countries it is now established.

In the past sixty years nearly a hundred individuals have been seen in Great Britain and a much smaller number in France and Portugal. Nearly all these were observed in the autumn. The food plant, milkweed (*Isclaspis* sp.), does not exist wild in Europe so the butterfly has never become established there. It is not yet known for certain whether the European specimens have flown across the Atlantic assisted by the prevailing westerly winds or have been carried across in ships.

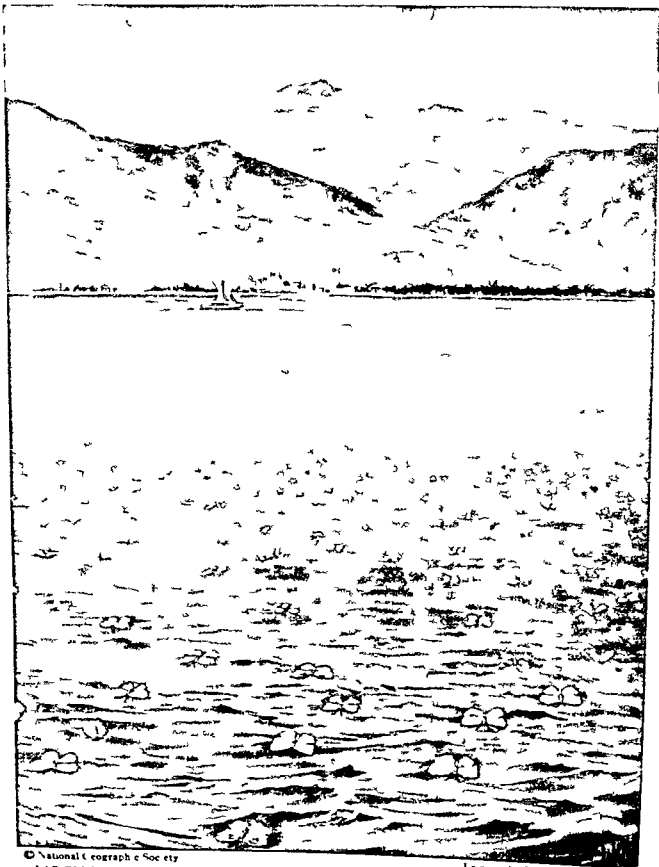
In North America this butterfly is found during the summer throughout the United States and Canada as far north as Hudson Bay and in the West occasionally as far as Alaska. In the early autumn the butterflies congregate into bands and fly southward starting from Canada about the end of August and reaching the Gulf States about the beginning of November. On the west coast they do not go so far south and may winter in the neighborhood of San Francisco.

Having reached the end of their southward flight the butterflies settle on trees still keeping to their large bands and spend the winter in a state of semi hibernation. They flutter around a little on fine warm days and in cold weather creep closer to the shelter of the trees.

The same group of trees may be used year after year by hibernating Monarchs although the same individuals never return south a second time. One of the localities on Point Pinos on Monterey Bay, California is a show place for visitors.

In the spring the bands begin to break up and the butterflies fly northward individually pausing here and there to lay eggs as they go. They start about March reach the level of West Virginia about April and Canada at the end of May or early June. The return flight starts after about three generations in the middle States two in the North and after a single generation in Canada.

* See in THE NATIONAL GEOGRAPHIC MAGAZINE Butterflies—Try and Get Them by Laurence Isley Hewes and Who's Who Among the Butterflies by Austin H. Clark May 1936 also Strange Habits of Familiar Moths and Butterflies by William Joseph Showalter July 1927.



© National Geographic Society

FAR-FLYING WANDERERS WINGS FLAPPING VIGOROUSLY HEAD FOR THE OPEN SEA

The sands upon thousands of butterflies make up this golden horde seen from a steamer deck near La Cera, Venezuela. Seldom do they rise more than three feet above the surface of the Caribbean (fig. 3) comprises nearly all the group—numerous also is the orange Traveling Butterfly (Plate II fig. 5) stragglers include *Phobos phleas* (Plate II fig. 4) and *Phobos vpris* (Plate II fig. 6). About 250 species of butterflies are known to migrate. Most of them take only one or two passages from the birthplace—a few make return flights.

Taken by Hashime Miyama



Photograph courtesy American Museum of Natural History

MASSED LIKE SWARMING BEES, MONARCHS CLING TO A TREE

With infinite patience and skill 1500 of the butterflies (*Danaus plexippus*) were mounted and arranged in these lifelike positions for the exhibit in the American Museum of Natural History, New York. Monarchs are the most familiar of the migrating butterflies in northeastern United States. Much larger gatherings than this have been observed in nature (Color Plate IV).

So far as I am aware, no Monarchs are normally found in Canada and the northern United States during the winter, although individuals have been seen in Toronto as late as the beginning of November.

The southward flying swarms are often very conspicuous as they may consist of tens of thousands of butterflies flying up to three hundred feet or more in the air, and when they settle for the night they may actually seem to change the color of the vegetation by their numbers.

MILLIONS ON THE WING

Hamilton, writing of a swarm in New Jersey in 1883, said: "The multitudes of this butterfly that assembled here in September are past belief. 'Millions' is but feebly expressive. 'Miles' of them is no exaggeration."

Ellzey, in 1888, describing a flight that he saw in Maryland wrote: "The whole heaven was swarming with butterflies. There were an innumerable multitude of them at all heights, from say 100 feet to a

height beyond the range of vision except by the aid of a glass. They were flying due southwest in the face of a stiff breeze."

Shannon, in 1916, suggested that this butterfly used definite flight routes on its way south, but the small number of records still available makes it doubtful if his conclusion is justified.

Another of the world's great migrant butterflies more widely distributed but less completely understood than the Monarch, is the Painted Lady (*Vanessa cardui*).

In North America this butterfly is practically never seen in the winter in any stage (although actually one was recorded in Colorado on January 1, 1935). In the spring in some years countless millions of Painted Ladies pour into southern California (and probably also into Arizona, New Mexico and Texas) from some unknown source in Mexico or beyond.

One such flight seen by McGregor in April, 1924, was at least 40 miles wide and was passing for three days at a speed of about six miles an hour. McGregor esti-

mated about 300 butterflies per acre, or a total of about *three thousand million* in the whole flight

There are records of similar great invasions in 1901, 1914, 1920, 1924, 1926 and 1931, but in other years scarcely any butterflies are seen

PAINTED LADY AS FARMER'S FRIEND

The Painted Ladies spread northward and eastward over the United States and southern Canada, and in 1931 they were so abundant in some of the North Central and Northeastern States that farmers rejoiced at the wholesale destruction of their thistles and asked the Department of Agriculture if these valuable insects could not be encouraged! They are not everywhere so popular, however (page 583)

We have to admit that nothing is yet known about what happens to the offspring of these immigrants, except that they disappear. The most natural explanation would be that they return to the South in the autumn as do the Monarchs, but there is little evidence to support this belief

The Painted Lady makes even more definite flights in Europe and North Africa. Swarms appear to originate somewhere just south or north of the North African desert belt in the early spring. They come into the coastal areas of North Africa from the south about April, cross the Mediterranean (sometimes in hundreds of thousands) and pass more or less northward through Europe. They reach England about the end of May or the beginning of June and occasionally carry on as far as Iceland, where they have been recorded about six times in the last sixty years

Farther east they spread northward through the Caucasus and on into Russia, where they have been recorded almost as far north as the Arctic Circle

Except in the extreme north the immigrants lay eggs which hatch and grow to be adults and there are some records of autumn flights which are evidently composed of the offspring of the spring migrants but as in North America, the evidence is insufficient at present to prove a return to the south. If such a return flight does take place it is probable that the insects move individually (as in the spring flight of the Monarch) and not gregariously

The only known record of the start of a flight is an observation made many years ago in the Sudan, when a naturalist (S. B. J.

Skertchly) in March 1869, saw thousands of chrysalides of the Painted Lady hatch simultaneously and the resulting butterflies fly off in a mass

Perhaps the best circumstantial evidence of the return flight in the autumn comes also from Africa, as an elderly ornithologist has told me that some years ago in Egypt he saw, on more than one occasion, Painted Ladies coming ashore on the north coast in August and September, along with the migrating quail

Farther south, in Nigeria and the Gold Coast, the Painted Lady appears suddenly about September or October, and there are three or four records of mass flights out at sea between the African coast and the Cape Verde Islands, also in the same two months. How these fit in with the movements farther north is not yet clear

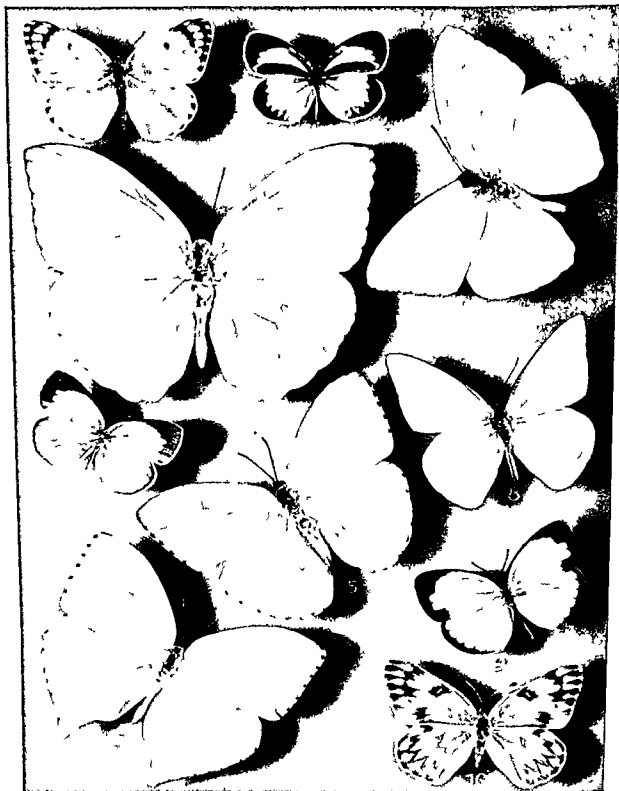
SOME PAN AMERICAN FLIERS

In North America another regular migrant is the Cloudless Sulphur or Traveling Butterfly (*Phoebis sennae* or *eubule* Plate I and Plate II, figure 3), which appears to come north from tropical America in the spring and to return south in the autumn. There are records of the southward flight in Georgia more than 50 years ago and also in South Carolina, New Jersey, Alabama and Arkansas, but the northward flight in the spring is less documented

The same species, along with the Embossed Wing Sulphur (*Phoebis statira*), *Phileas* (Plate II figure 4), *P. argente* (Plate II figure 5), and other members of the genus is a regular migrant in tropical America, for example in Venezuela, Trinidad and British Guiana. It has also been seen in flights as far south as Argentina, where it goes northward toward the Equator in the Southern Hemisphere's autumn (March and April) with many other butterflies

The Great Southern White (*Ascia monuste*) makes flights in Florida chiefly toward the south in May and June, and has also been seen in mass flights in Jamaica, Costa Rica, British Guiana, Uruguay, and Argentina

The Snout Butterfly (*Libythea bachmani*) has been seen several times in enormous migrations in Texas, usually in August or September. One of these flights in September, 1921, was said to extend over a front of 250 miles, and one and a quarter million butterflies passed per minute on the whole front. The flights are

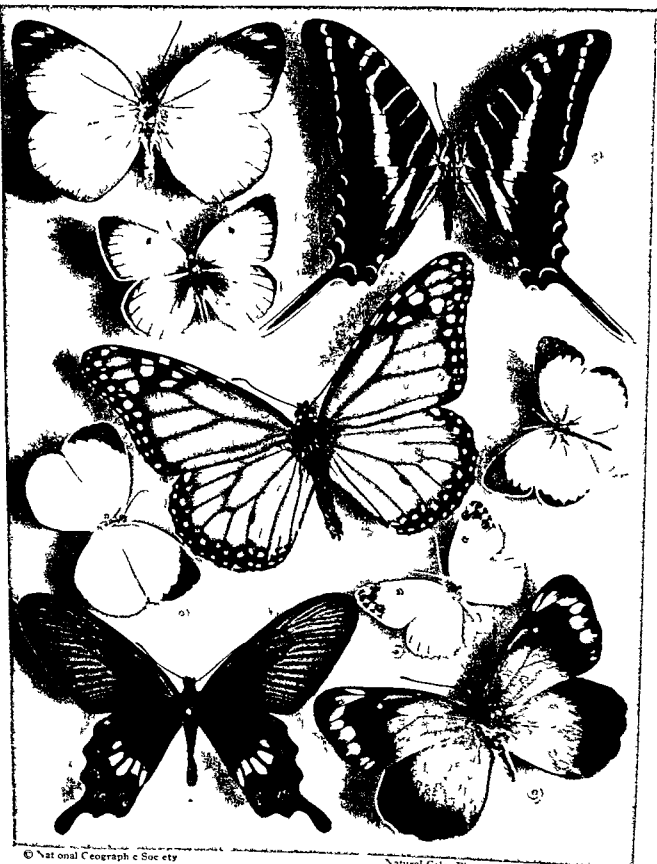


© National Geographic Society

Natural Color Photograph by W. Ward R. Culver

MANY STRONG WINGED EXPLORERS WEAR BRIGHT COLORS

(1) *Teracolus fusca* Syria (2) *Terias India* Mexico (3) a close up of the yellow "Traveling Butterfly" (*Phoebis eadula*) portrayed in mass migration in Plate I tropical and subtropical North and South America (4) *Phoebis philea* tropical America has been caught in New York and Nebraska (5) *Phoebis argente* tropical America, (6) *Phoebis cypria* tropical America (7) *Terias tenet* India (8) *Appias albina* East Indies (9) *Terias hecabe* Philippine Islands (10) Western Checkered White (*Pieris occidentalis*) western United States



© National Geographic Society

Natural Color Photograph by Willard R. Culver

AMONG THESE MIGRANTS FROM FAR AND NEAR ARE SEVERAL OFTEN SEEN AT SEA

Under sides of wings are frequently more brilliant than the upper (1) *Delias nigra* upper side, Australia (under side shown in Plate VII fig 1) (2) *Colias lesbia* Argentina (3) *Ipilio philolaus* Central America (4) *Irias lisa* eastern North America (5) *Pontia daplidice* northern Africa, (6) *Terias albula* South America (7) *Danaus erippis* South America which resembles its North American cousin the Monarch and is seldom observed over the ocean (8) Rose Butterfly (*Papilio aristolochia*) Ceylon, (9) *Delias* species undetermined Australia which also prefers to stay on land

usually moving toward the east or south east but nothing is known of their origin or destination.

A remarkable flyer is the little yellow butterfly *Terias lisa* (Plate III figure 4) which on several occasions has appeared in great numbers in the Bermuda Islands. Undoubtedly these had flown from the North American Continent, whose nearest point Cape Hatteras is more than six hundred miles away.

Other lesser known migrants include the Gulf Fritillary (*Dione vanillae* Plate VI figure 3) which is said to appear in Kansas only between August and November and has also been seen in flights in the Galapagos Islands and Argentina and the Californian Tortoise Shell (*Iglais californica*), the mass movements of which have been seen almost entirely in the autumn in Oregon, California and British Columbia often thousands of feet up on the mountains.

While motoring from Medford to Crater Lake Oregon July 24 1932 the Editor of THE GEOGRAPHIC and his wife ran into such myriads of Californian Tortoise Shells that every few moments it was necessary to stop the car to clean the windshield of the crushed bodies. The following day from the crater rim 8 239 feet they watched the butterflies flying across the lake in countless numbers coming from the north and headed south. The flight continued for several days.

The Brazilian Skipper (*Calpodus ethlius*) has been recorded in great swarms in Central America and in the West Indies and stragglers occasionally reach as far north as Washington D. C. or even New York where the caterpillars have been found on cannas. In the island of St. Vincent in the West Indies growers of arrowroot find them a serious pest.

THE MASTERS OF THE COTTON WORM

As noted the Cotton Worm Moth (*Alabama argillacea* Plate VI figure 10) is a moth that has been known to be a migrant for many years (page 568). It appears in the spring in the Cotton Belt of the Southern States from some unknown source in tropical America and breeds for several generations in the cotton fields.

Then in the autumn when one might expect it to return south whence it came the only evidence that we have is the extraordinary fact that millions of moths suddenly appear around lamps in some of the cities and towns of the Northeastern States

and southern Canada many hundreds of miles north of the nearest cotton fields and in an area where it would seem impossible that a single individual could survive.

Are we to suppose that this is the normal behavior of the species? Or do most of them really return to the South and are these northward wanderings merely mistakes of Nature?

SOME EUROPEAN MIGRANTS

Turning once more to Europe we find there are a number of migrant butterflies that also are known in North America. *Aglais antiopa* which the British call the Camberwell Beauty and Americans more soberly, the Mourning Cloak is an autumn visitor in Great Britain possibly from Scandinavia. It arrives in small numbers nearly every fall and then hibernates.

Very rarely is a survivor seen in the spring and there is no record of the species ever having bred in Great Britain in spite of the continued search for caterpillars by amateur entomologists for more than a hundred years. There seems to be practically no evidence that the butterfly migrates in North America.

The Red Admiral (*Vanessa atalanta*) is another regular migrant in Great Britain arriving in the spring and breeding during the summer. Definite evidence is now accumulating that there is a southward movement in the autumn but a small proportion of the population does undoubtedly hibernate and survive till the following spring without leaving the country.

The three common Cabbage Whites of Europe—*Pieris brassicae* the Large White, *Pieris rapae* the Small White and *Pieris napi* the Green veined White—are all regular migrants the last named however, much less so than the other two. The Large Cabbage White appears to have a head quarters in some of the islands of the Baltic Sea or in southern Scandinavia and about July or August countless millions often like snow storms are seen passing southward through Germany.

Farther west they appear to fly more toward the west and reach the southeastern shores of Great Britain where they are at times seen coming in from the sea in large numbers. The Small White and more rarely the Green veined White are often found mixed in the same flights.

The Small White which was accidentally introduced into North America about eighty years ago has already increased to suffi-

cient numbers in its new home to indulge in similar mass flights one of which was seen on the shores of Lake Ontario in August 1917. The species has also within the last few years been introduced into New Zealand where it is multiplying with great rapidity. It will be interesting to see how soon mass movements occur there and what direction they will take.

Two other regular migrants in Europe are the Clouded Yellow (*Colias croceus*) and the Pale Clouded Yellow (*Colias hyle*) both of which appear to come north from southern Europe in spring and reach Britain about the end of May or the beginning of June. Here they lay eggs which produce adults in August but none of these survive the winter in England.

There have however been one or two records recently of flights of Clouded Yellows to the south in France in the autumn so that it is possible that this species also returns to its original home.

Half of the British Hawk Moths (Sphingidae) and many of the smaller moths are also migrants. The Silver Y (*Pluta gamma*) and the Rush Veneer (*Emmophila noctuella*) are of special interest as they appear in large numbers usually at the same time as the swarms of Painted Lady Butterflies. Despite the difference in their size and feeding habits there is some evidence that all three species migrate in company.

DAGGER WINGS FLY IN COLUMNS

In addition to the species already discussed (page 571) there are a number of other regular migrants in tropical America.

One of the more striking is the Many Banded Dagger Wing (*Athena chiron* Plate VI figure 6) which migrates regularly in Mexico, British Honduras, Nicaragua, Costa Rica and Panama. It was first recorded in 1872 by Thomas Belt in his *Naturalist in Nicaragua*. He writes:

They occurred as it were in columns. The air would be comparatively clear of them for a few hundred yards then we would pass through a band perhaps fifty yards in width where hundreds were always in sight and all traveling one way. I took the direction several times with a pocket compass and it was always southeast.

Belt concludes: The beautiful tailed green and gilded day flying moth *Urania leilus* also joins in this annual movement. He was actually mistaken in the name he

used for his species but the two day flying moths (*Cydonia leilus* and *C. fulgens*) are perhaps the most beautiful and conspicuous of all the Central American migrants.

The insect known in the West Indies as the Green Page Moth (*C. leilus* Plate VI figure 7) is found chiefly in Trinidad, the Guianas and Brazil while the closely related species *C. fulgens* the one seen by Belt is known to migrate in Mexico, Nicaragua, Costa Rica and south to Ecuador.

In British Honduras the Swallowtail Butterfly *Papilio philolaus* (Plate III figure 3) has been recorded passing in great numbers in one direction.

In temperate South America many of the North American migrants reappear including *Dione vanillae* (Plate VI figure 3), *Ascia monuste*, *Phoebus eubule* (Plate II figure 3) and *Vanessa carye*. Charles Darwin in 1832 saw a great flight like a snow storm of yellow butterflies out at sea off the Bay of San Blas in Argentina. The flight was 600 feet high, a mile wide and many miles long. The species is now believed to have been *Colias lesbia* (Plate III figure 2) which is closely related to the North American Clouded Sulphur and to the English Clouded Yellow.

MIGRATIONS IN AFRICA

North Africa appears to be the source of a number of the European migrants and its problems are those of Europe. Tropical Africa is quite separate and has entirely different migrants in the east and in the west. South Africa appears to be closely associated with the East African area.

In western Africa the two principal migrants are *Libythea labdac* (Plate VI figure 9) which moves in enormous swarms in Nigeria and the Gold Coast and *Cymothoe coenis* which has been recorded in mass flights in the Belgian Congo and Uganda. The former species has been seen moving southward about March or April.

Writing of the former species Farquharson in 1918 said: Early in the rains for two or three days thousands of migrating butterflies pass here (Ibadan, southern Nigeria) flying southward. The negro peasant knows that after that he may safely sow his cereal crops. Towards the end of the rains swarms of the same butterfly return northwards. One may conclude that the rains are over. No more recent observer has reported seeing the return flight to the north.



© National Geographic Society

MONARCHS BY THE SQUADRONS GORGE ON GOLDENROD TO STORE ENERGY FOR THEIR MIGRATORY FLIGHT

These nomads of North America are better known as Milkweed Butterflies (*Danais plexippus*) because the caterpillars feed on that plant. During early autumn adults frequently congregate in flocks and fly south for the winter. When spring comes they move northward again, sometimes reaching Hudson Bay and Alaska. Monarchs have spread to Madeira, Formosa, New Zealand, and Australia, where they are now common. A few specimens have been caught in Europe. Whether they flew across the ocean or were carried on ships still puzzles naturalists.

Painted by Hatching Nuraama



© National Geographic Society

Painted by Hashime Murayama

LIKE FAIRY FRIGATES ABOUT TO BE LAUNCHED SEEM THESE MUD LOVERS WITH HOISTED SAILS

On warm sunny days, myriad wanderers congregate in groups on muddy banks of southern streams. Large yellow ones are travelers shown in Plates I and II (fig. 3); the smaller yellow Lesser Swallows also fly far (Plate III, fig. 4). The striped butterflies reflected in the water are Zebra Swallowtails (*Graphium sarpedon*). Three Silk Butterflies (*Apantesis*) sun themselves at the extreme left; above the yellows rests a Giant Swallowtail (*Papilio cresphontes*), and to their left is a single Spicebush Swallowtail (*P. troilus*). In the center is a lonely Parsnip Swallowtail (*P. polyxenes asterius*).

In East Africa there are three principal migrants a yellow sulphur butterfly (*Catopsilia florella*) and two closely related brown veined whites (*Belenois mesentima* and *B. severina*). *Catopsilia florella* has been seen migrating in South Africa Rhodesia and East Africa and in the Sudan and is known to appear suddenly in numbers in Egypt at long intervals.

A FLIGHT FOR 16 WEEKS—AND STILL GOING STRONG

I observed a thin migration of this species flying to the north in Tanganyika in 1929. The flight continued every fine day for 16 weeks and was still going on when I left the locality.

Belenois mesentima has much the same range and also regularly appears as an immigrant in southern Palestine. In East Africa it moves in huge bands nearly every year between January and April but is then replaced by the second species *B. severina* which appears to continue moving till about the end of July. Both butterflies feed on the caper plant (*Capparis*) found in arid and semi desert country. This probably explains why they are not seen on the damp forest covered west coast.

On the east coast of Africa there is also a migrant skipper butterfly (*Andronymus neander*) which passes through northeastern Tanganyika nearly every year in March flying to the south. One flight that I saw lasted for 48 days and reached a maximum intensity of about 500 insects per minute passing on a twenty yard front.

MIGRANTS IN ASIA AND AUSTRALIA

In Asia by far the most regular movements of butterflies have been recorded in Ceylon where more than 60 species are known to take part in them. The flights are grouped chiefly into two seasons one in November-December more or less at the beginning of the northeast monsoon and another in February to April toward the end of the monsoon. The direction of the flights is confused but it has been suggested that some of the species fly southward down the east side of the island westward along the south coast and then turn northward up the west coast.

In the absence of observers and records it is impossible to say whether they complete the circuit by flying eastward along the north coast and so end up where they started from. There is undoubtedly some

interchange of migrants between India and Ceylon particularly along the line of islands known as Adam's Bridge.

In southern India Mr J. F. Vershed an observer in the Ialm Hills at an altitude of about 8000 feet noted for many years a big southerly movement of butterflies in October and a smaller return flight to the north in February and March. The species in the southward flight included many of the principal Ceylon migrants but in the return flight only the Pierids (*Catopsilia* and *Appias*) were represented.

Some of the commoner migrant butterflies of Ceylon and southern India are illustrated in the color plates including several swallowtails—Plate III figure 8 Plate VI figure 4 Plate VII figures 3 and 7 and Plate VIII figures 5 and 6. *Danaus aglea* (Plate VII figure 2) is a relative of the Monarch Butterfly. Two are species of the great family of whites—Plate II figures 7 and 8 and three are nymphaline butterflies—Plate VI figures 1, 2 and 8.

In northern India there appears to be a regular movement up to the highlands of the Himalayas in the spring at the beginning of the hot weather in the plains. The species include the Long tailed Blue (*Lampides boeticus* Plate VI figure 5) and the Cabbage White (*Pieris brassicae*) both of which are migrants in Europe.

In Iran there are records of the movement of an orange-yellow butterfly *Te racolus jausta* (Plate II figure 1) in addition to the ubiquitous Painted Lady.

There are several records of mass movements of butterflies in Burma Siam and the Malay Peninsula chiefly of species of *Catopsilia*, *Appias* and *Danaus* but at the moment we have not a single record for the whole of China and only one for Japan. This last is a note on a flight of the Small Cabbage White (*Pieris rapae*) across Kago shima Bay in 1886.

In Australia the two chief migrants are a white butterfly (*Belenois java*) and a skipper (*Badamia exclamationis*). The former which is a close relative of the two African migrants *Belenois mesentima* and *B. severina* appears at times in enormous numbers in the spring (November to January) in southeastern Australia particularly in New South Wales. The swarms have been recorded flying out to sea and dead butterflies have been found washed up along the coast line for many miles.

The skipper is found farther north in

Queensland. One observer near Cairns reports that there are two or three flights a year. These last for two or three weeks and are always to the northeast. He estimates that 24 000 insects pass over every 100 yard front each hour. Another says that the butterflies fly south at one time of the year and north at another. Still a third observer says that the swarms originate in New Guinea, come south into Queensland and then return four months later.

Two species of *Delias* (Plate VII figures 1 and 2) have also been recorded as making mass flights in Australia but there are no recent records and more information is much needed.

MIGRATION HABIT IS WORLD WIDE

Thus in nearly every country in the world there is evidence that some species of butterflies take long flights more or less in one direction. In a few of these species there is evidence of a return flight in the opposite direction at another time of the year. In the majority of species there is no evidence of a return but this of course is not proof that the return does not take place. Absence of evidence is not evidence of absence. It is probable that in some cases the flights in one direction are very much thinner than in the other, and hence much more difficult to observe.

The flights in the temperate and sub-tropical parts of the world appear to be away from the Equator in the spring and toward it in the autumn as is the case with most birds but there are a few exceptions to this. In the eastern Tropics particularly in southern India and Ceylon there is some evidence that the migration seasons are related to the monsoon.

The flights may consist of a few hundred individuals only or up to thousands of millions. They may pass a point of observation in a few minutes in a compact mass or may form a thinner flight which may continue passing for days or even weeks. The flight may even be so thin that the individual butterflies are quite out of sight of each other in this case the movement is not likely to be noticed except by an expert who is on the lookout.

A CHALLENGE TO NATURALISTS

It is difficult to state the lower limit of distance that we could call a migration. But there is no doubt that the upper limit is surprisingly high and that some migrant

butterflies cover well over a thousand miles more or less in one direction before they settle down to their normal life again.

A statement of such extraordinary facts is a challenge to any naturalist. A hundred questions arise in his mind. What species of butterflies migrate? At what season of the year is the habit developed? When and where do they start? What route do they take? When do they stop? Is the movement correlated with any particular weather conditions or food supply?

Such questions can be answered only by more and more observers recording more and still more facts—always watching out for evidence of movement of insects and putting it on record whether it proves or disproves their own particular theories.

Then there are questions of theory and explanation. Why do the butterflies leave their starting point? What makes them choose one particular direction more than another? And what makes them stop?

Last of all there are the fundamental questions. Why do they migrate at all? How did the habit start? What good is it to the individual or to the species? And if we can prove a benefit have we explained the habit?

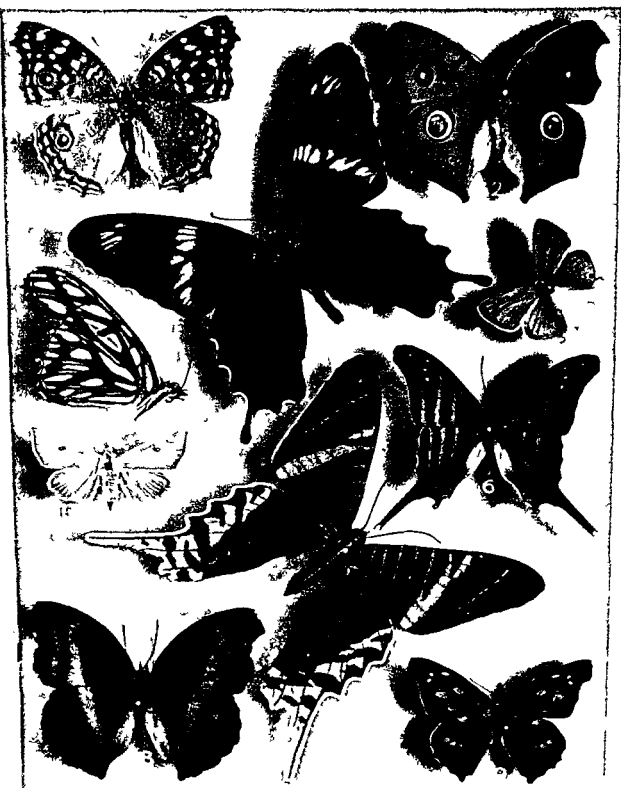
The evidence at present available indicates that migration takes place in about 250 species but in many of these there is only a hint or a single record of movement. The species in which the regularity of migration is really well established have practically all been mentioned above.

It is however almost certain that the actual number of migrant butterflies is much higher than this perhaps a thousand or more species. In Great Britain where the subject has been more intensively studied and where there are records of amateur collectors going back well over a century we know that 13 species of the 68 found in that country are wholly or partly migrants. Since one or two of the 68 are practically extinct we can say that one fifth of the species are migrants.

In Ceylon more than one-quarter of the known butterflies have been recorded in mass movements. If these ratios are anything like normal for the rest of the world it is easy to see what a small proportion of the migrants have yet been recognized.

Exactly how does a migration differ from an ordinary flight?

Observations on the flight of migrants made over measured distances with a stop



© National Geographic Society

Natural Color Photograph by Ward R. Culver

COLLECTORS IN MANY LANDS SNARE THESE RESTLESS FLYERS

(1) *Precis leonotis* India (2) *Precis almana* Ceylon (3) The Gulf Frillary (meaning spotted) under side *Dione ornata* tropical and subtropical America (4) *Lipilio hector* India (5) *Lan pylas boeticus* Africa (6) *Ithene chiron* Central America (7) the Green Page Moth (*Cydin n leilus*) Trinidad (8) *Precis iphita* India (9) *Ithythet labdara* west Africa and (10) *Albimix argillaceus* of which the caterpillar is known as the "Cotton Worm" in southern United States



© National Geographic Society

Natural Color Photograph by Willard R. Culver

NATIVES OF AUSTRALIA AND INDIA ARE THESE GAUDY ADVENTURERS

A south India observer reports that two annual butterfly migrations occur in the Palm Hills. A huge southward flight takes place in October and a smaller one northward in February or March. Shown here are (1) *Delias migrina* Australia under side (Plate III fig 1) (2) *Danaus aglea* India, side (3) *Pterodorus agamemnon* India (4) *Pterodorus amatus* India (5) *Delias karpahce* Australia under side (6) *Dinaus affinis* Australia (7) *Pterodorus moleus* India

watch indicate that the speed is little, if any, faster than normal flight speeds of from 5 to 15 miles an hour have been noted. If a butterfly is on the wing for several hours a day in normal flight it must cover many miles of ground, but the flight is as often one way as another, and it ends up not far from where it has started.

In my opinion the chief characteristic of the migratory flight is that it is normal flight straightened out—that the insect has a sense of direction and is able to keep to one direction hour after hour and day after day. This and the fact that it appears to be less distracted by the way-side temptations of food and sex are sufficient to account for the great distances covered in a straight line.

WHY DOES A FLIGHT START?

The start of a migratory flight has been attributed to various causes—to starvation, overcrowding, too many parasites, and unfavorable weather conditions. Starvation I think, may be ruled out as a general cause because the migrating individuals are usually well developed specimens, often with a large reserve of food in the form of a fat body stored up during the caterpillar stage from surplus nourishment.

There does, however, appear to be some evidence that crowding in the caterpillar stage brings about the migratory instinct. In the butterflies the evidence is somewhat indefinite. Thus it has been stated that where caterpillars have been crowded migration has followed, and, indeed, it would be difficult to imagine some of the enormous swarms of butterflies originating without the caterpillars having been crowded to some extent.

There is some evidence of the reverse, however, as great swarms of overcrowded caterpillars have been known to produce swarms of butterflies which did not migrate, even when the habit was known to exist in the species. Also, Monarch Butterflies, which have developed from scattered larvae actually congregate just before migrating, although it is possible to bring this into line by saying that it is the crowding in the adult stage which releases the instinct.

The really important evidence for the fact that overcrowding instead of food shortage, is a cause of migration, comes from another group of migratory insects, the locusts. In this group the migrating and nonmigrating individuals of the same

species can be distinguished from each other by structure, color, physiology, and behavior, and it has been shown experimentally that from the same batch of eggs migrating forms can be produced by overcrowding and nonmigrating forms by isolation.

In the butterflies experimental evidence on this point is not forthcoming, nor, so far as I am aware, do the migrant individuals ordinarily differ in color or structure from the nonmigrants.

BUTTERFLIES FLY A BIFF LINE

The instinct to keep flying in one direction, and the ability to do so, are so highly developed in migrating butterflies that they have been known to fly through railway tunnels, and into the windows of rooms and out at the other side if they could rather than deviate from their course.

In East Africa I have seen migrating white butterflies (*Belenois mesentina*) beat themselves against the wall of my bungalow which happened to be in their way. They also were observed rising to the top of a tall tree, shaped somewhat like a Lombardy poplar, and descending on the other side when a movement of three or four feet left or right, would have taken them past the obstruction with one tenth of the effort.

How does the butterfly keep to its direction? We have not the faintest idea.

An analysis of several hundred records in which both flight and wind direction were known showed just as many flights into the wind as against it, and migrations have been known to go on steadily when there was not enough wind to move a feather.

It also has been suggested that the butterflies orient themselves by the sun. Do they then allow for the gradual movement of the sun across the sky from east to west? And what about insects that migrate at night, the moths for example? Also many butterflies migrate at midday in the Tropics when the sun is exactly overhead.

A magnetic sense has been suggested. It sounds very simple. But what about magnetic storms? And how could allowance be made for the continually changing difference between the true north and the magnetic north? No morphologist has yet found in any insect an organ that is sensitive to the magnetic field.

Of course memory is ruled out because no butterfly makes the journey twice.

in the same direction. Even in the case of the Monarch which makes a round trip the southward flight is made by butterflies which have never migrated before and which are children grandchildren or even great grandchildren of the last migrants.

So we must for the moment call the sense of direction an instinct recognizing that we have no explanation and we must continue to look for further evidence both in the field and in the laboratory.

THE END OF THE FLIGHT

It seems quite clear that the butterflies do not set off for some promised land flowing with milk and honey and settle down when they reach it. Sometimes they do indeed come to areas suitable for temporary breeding areas which have been reached many times before. Almost as often they pass through these countries and instead of settling down they may fly on and on out into the ocean or to the Arctic lands where practically all perish.

It would appear that while the migrating instinct (one might almost call it hysteria) is on they must continue flying until the stimulus has worn itself out and it is more or less chance if this happens in suitable or unsuitable country.

If one imagines two countries one of which is suitable for occupation by a particular insect only in one part of the year and the other country in the other half of the year then the insect would be able to survive only if it could develop a habit of moving regularly twice a year from one country to the other. The habit would not be merely useful to the species but a vital necessity.

We do not know enough about the migration of butterflies to say whether such a simple case occurs but on the whole the evidence appears to indicate something different. The insects in most cases seem to migrate from a country which can and often does support them in small numbers all the year round and fly to areas which are suitable only for temporary habitation.

For example the Monarch migrates northward from the southern United States in the spring but can survive in the South without moving. The same is apparently true of the Painted Lady in North Africa and southern Europe. We have no evidence that it is unable to survive in the south in spite of the fact that so many move north.

This brings us to the fundamental im-

portance of the return flight from the theoretical view of the evolution of the habit. If a butterfly lives permanently in one country and at intervals sends off migrants to other areas which can only be temporarily occupied and if none of these ever return then we are faced with a grave difficulty.

We have an instinct which has persisted for thousands or millions of years yet the species is perpetuated solely by the individuals which do not develop that habit but stay behind in the permanent breeding ground. This is exactly contrary to Darwin's theory of evolution by the survival of the fittest.

It is therefore interesting to note that about twenty years ago it was thought that there was practically no evidence of a return flight in any species with the exception of the Monarch. Since then however evidence has been accumulating rapidly and we now have records that support the idea of a return flight in at least 20 species. Perhaps we shall find eventually that the difficulty of explanation was due only to our lack of knowledge of the true facts.

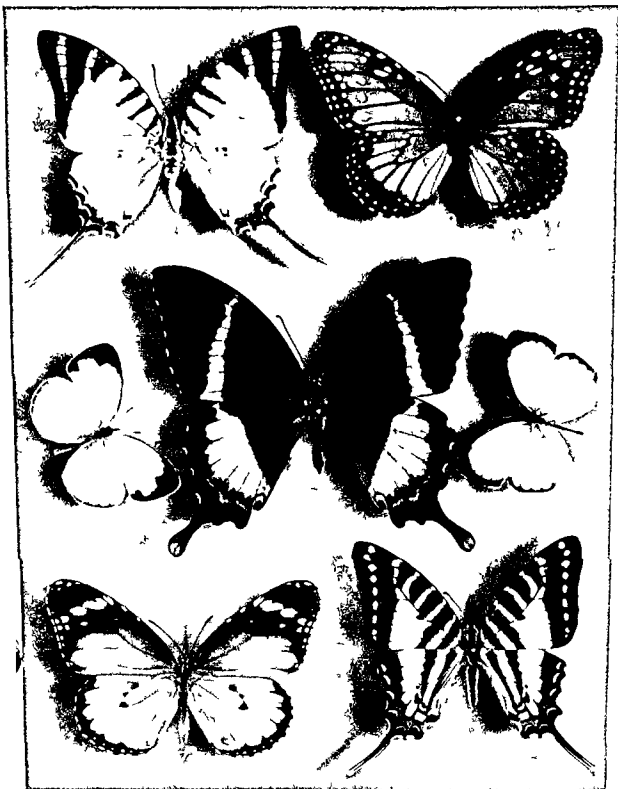
It might be pointed out here that an alternative to migration for avoiding a period of unfavorable conditions is an ability to go into a dormant stage such as hibernation or estivation. The birds for example have specialized in migration and none hibernate but among the mammals hibernation is quite frequent and migration much less so. It therefore is curious to find that the Monarch Butterfly migrates a thousand miles or so apparently only to hibernate when it reaches the end of its journey.

MIGRANT INSECT PESTS

The subject of the migration of butterflies and moths has a distinct economic interest for of what value is it to advise a farmer to take precautions against the multiplication of a pest if that multiplication takes place a thousand miles away?

Some of the migrant butterflies and many of the moths are serious pests in various parts of the world. The Painted Lady although useful as a thistle eater in North America is a plague on artichokes in the south of France. The Cotton Worm has already been mentioned (pages 368-374).

In Egypt there is a moth known as the Greasy Cutworm (*Agrotis ypsilon*) which damages wheat in the winter and cotton in



© National Geographic Society

Natural Color Photograph by Ward R. Culver

SWALLOWTAILS OF SIAM (1) AND INDIA (5 AND 6) WANDER FAR FROM HOME

Traveling butterflies vary greatly in size, shape, and color. Some varieties cover the same routes year after year, while others have less regular habits. (1) *Papilio antiphoes porphyrius* Siam (2) *Danaus gilippus* Argentina (3) *Terthis senegalensis* Africa (4) *Terthis marshalli* Africa (5) *Papilio crino*, India, (6) *Papilio nominus* India (7) *Danaus chrysippus* Africa

to detect submerged submarines. It measures from the 100 minute variations in the intensity of the earth's magnetic field, such as would be caused by so large a mass of metal as a submarine.

As soon as the existence of the instrument became known to the U. S. Geological Survey, it was obvious that it might prove of enormous value for wide scale geological explorations.

It had previously been determined that this magnetic intensity showed considerable variation with the major types of rock—igneous, sedimentary, and metamorphic—because of their different magnetic properties and with the contours in which they were arranged.

It has been observed that 'the magnetometer starts where radar ends.' It might be described as an X-ray radar, by which one can see under Mother Earth's skin.

Land under the Icecap Probed

Surveys of more than 200,000 square miles in the United States and Alaska showed that the magnetometer fulfilled all its promise. It was of special value in locating geological structures which most frequently are associated with petroleum deposits.

For purposes of exploration the instrument was improved so that an automatic continuous record of magnetic intensity was correlated constantly with a plane's position in space to obtain an uninterrupted recording of the geophysical structure of the country flown over.

Such an airborne magnetometer was operated on four flights from the Little America base by James R. Balsley, Jr. of the Geological Survey staff. The over-all result was to demonstrate that it was possible to record in this way what lay under the Antarctic icecap.

Near the eastern edge of the Ross Shelf Ice is Roosevelt Island. It is believed to constitute the fulcrum upon which two ice shelves, the Ross and Prestrud, turn to form the Bay of Whales a few miles to the north. But it is completely ice covered to a depth of about 500 feet. It hardly protrudes from the rest of the shelf. Even its existence has been debatable. Balsley's magnetometer recordings showed unmistakably that it is a real body of land composed chiefly of granite rock.

A somewhat smaller island shown on maps at the entrance to the Prestrud Shelf slightly to the southeast was demonstrated either not to exist or to be composed of sedimentary rocks. The former conclusion is considered more probable.

Another flight was over the Edward VII Peninsula and the Rockefeller Mountains. In this area laborious geological studies have been made on the ground. It had been de-

termined that the mountains are composed largely of granite-like rocks. The magnetometer, from a thousand feet above, gave precisely the same results.

On the other hand, the instrument showed that that magnificent landmark, La Gorce Peak, named for my old friend Dr. John Oliver La Gorce, was composed almost entirely of sedimentary rocks compressed from ocean bottom muds through millions of years.

At one point the edge of the Ross Sea was found 20 miles east of the line designated on existing charts. A source of peculiar satisfaction was the finding of considerable magnetic intensity variation in the neighborhood of Kanan Bay. Dr. Siple had predicted, from the nature of crevasses there, that the point must represent a break of some sort in the earth's structure—probably an island. The magnetic readings verified this supposition.

The detector element of the magnetometer is housed in a streamlined bomb-shaped case known as the 'bird,' which is towed behind and beneath the plane on a cable 100 feet long. This is to eliminate the magnetic effect of the metal in the aircraft itself. The measurements are so delicate that every possible contaminating factor must be removed to make valid conclusions.

Undoubtedly there are both valuable and precious minerals under Antarctica's ice. It is difficult to conceive of such a large part of the earth's surface without them.

The magnetometer can at least give a good indication of where to look. It cannot identify specific minerals such as gold or uranium. It can detect, as has been demonstrated in the case of oil, the geophysical formations where they are most likely to be found.

South Magnetic Pole a Large Oval

Study of the earth's magnetism itself naturally has a notable part in the program of any polar expedition. This field of science was represented by Dr. H. Herbert Howe and Lt. C. A. Schoene, both of the Coast and Geodetic Survey.

Available evidence indicates that the South Magnetic Pole must be considered a roughly oval region, perhaps more than 1,000 square miles in area. At numerous points in this oval a compass needle on a horizontal axis would point straight downward and these points would change position from day to day. The actual pole might be considered as the mathematical center of this region.

The North Magnetic Pole has shifted somewhat in the past few years. The South Magnetic Pole evidently has shifted also, but we haven't enough data to prove it.

That strange phenomenon which Dr Siple calls the "antithesis of darkness," and which caused our aerial tragedy (page 502), constitutes one of the constant perils of the Antarctic, and must be understood before it can be conquered. It is especially important for airplane landings, which require fine judgments of the elevation and contour of the snow surface. It is a weird white light experienced chiefly on cloudy days when a wool-like fleece covers most of the sky.

On such days there are no shadows. Near-by objects, especially men dressed in white, vanish and reappear without warning.

Sunburns, although no sun is visible, are likely to be severe, and the worst burned areas may be the bottom of the chin and the palms of ungloved hands. Visibility is extremely bad. Elevation and depressions which ordinarily serve as landmarks are merged into an endless white flatness. Walking becomes a blind staggering because there is no way of judging the level of the snow surface.

Weird White Light a Danger Source

On such a day tractor and sledge parties away from base in unknown territory can proceed very slowly, if at all. The absence of shadows leaves the men with no means of detecting the parallel windrows of arched snow which indicate crevasses.

In the North a similar phenomenon, known as "Arctic white out" has caused airplane accidents.

Dr Siple's tentative hypothesis is that this "antithesis of darkness" can be explained as a phenomenon of multiple reflection of sun light. Visible and short wave invisible radiation is trapped between earth and sky.

Ordinary sunshine striking the earth is partly absorbed by the varicolored landscape and partly reflected back into space. Here there is only the unbroken whiteness of the neve. It is an almost perfect reflector.

The radiation rejected by the earth cannot get past this cloud screen into free space again. A certain amount of it is reflected back against the snow, to be re-reflected against the clouds.

Thus there is a constant building up of trapped light, which is added to that received each instant from the sun itself. Light is coming from above, from below, and from all sides where there are snow-covered slopes. The area within the Antarctic Circle is like a titanic hall of mirrors.

This trapped light hypothesis obviously is only a tentative attempt to explain an eerie phenomenon of the polar regions. The explanation remains debatable.

Antarctica is swaddled in a warm blanket

This remarkable fact was established by duly soundings of the upper atmosphere by radio sondes, the astounding little robot observers which can be sent aloft by free balloon and which send back a continuous record of the conditions they encounter.

Here Stratosphere Is Closer to Earth

Over the Equator the temperature drops with altitude up to about 60,000 feet—the floor of the stratosphere there.* Thenceforth it remains constant or may even show slight increases.

Over Antarctica there is a different situation. Two thousand feet above the earth throughout the summer was found a layer of atmosphere about 300 feet thick in which the temperature generally was eight to ten degrees higher than at the ground. One recording was 14 degrees higher. Such inversions of temperature are known elsewhere.

Once this stratum is passed, the temperature declines steadily to about 60 below at 23,000 feet. In the next mile of altitude it increases about five degrees.

This means that Antarctica's summer stratosphere is only about two fifths the height of that over the Equator and two thirds as high as that over the United States. In winter it is about the same as in summer, or possibly a little lower.

Flasks were filled with South Pole wind-air which had moved northward at least a thousand miles over the continent at an altitude of more than 6,000 feet—for chemical analysis at the Bureau of Standards.

Breathing Antarctic atmosphere has a curiously exhilarating effect. It is one of the attractions which bring men back to these frozen wastes on expedition after expedition.

No Colds till New Men Arrived

While the winelike quality of winds over the ice mountains doubtless is partly psychological, there remains the fact that this air is a slightly different mixture of gases from that of air in middle latitudes. It contains, for example, less than a third as much water vapor as atmospheric samples collected at the Equator. Further studies with respect to the amounts of carbon dioxide, nitrogen, oxygen, and argon are still being made.

Antarctica is sterilized by millions of years

* See in the NATIONAL GEOGRAPHIC MAGAZINE "Exploring the Earth's Stratosphere" by Lt. John A. Macready, December 1926. "Ballooning in the Stratosphere" by Auguste Piccard, March 1933, and all by Capt. Albert W. Stevens, "Exploring the Stratosphere," October 1934. "Man's Farthest Aloft," January 1936, and "Scientific Results of the World Record Stratosphere Flight," May 1936.



An Injured Arm Gets Expert Attention at the World's Southernmost Hospital

In the sick bay at Little America IV Dr H H Richardson of Beaver Pennsylvania an Antarctic veteran gives emergency treatment for a minor accident on the ice. An oil burning stove keeps the tent warm.

of cold—a hypochondriac's dream land. Normally a person is safe here from such maladies as the common cold, influenza, and pneumonia.

Among the personnel of the expedition, respiratory diseases had disappeared and sick bays were empty except for accident cases until the arrival of new men late in January aboard planes from the aircraft carrier.

They brought with them varieties of the cold virus which were transmitted rapidly in the warm ship wardrooms and soon there was a mild epidemic of sneezing and coughing.

In the meteorological studies, balloons dragging targets which could be tracked by radar—a system developed for Air Force meteorologists during the war—were used to determine the velocity and direction of winds over the low cloud cover which overlies the entire region most of the time. The method functions up to about 30,000 feet (page 496).

Some curious meteorological phenomena were observed. One day at Little America, for example, there was a cloudless sky with

perfect visibility for about eight hours. It was possible to follow with the naked eye an ordinary weather balloon up to 79,000 feet before it finally faded from sight in a deep purple sky where shone the planet Venus. There was a grass green horizon.

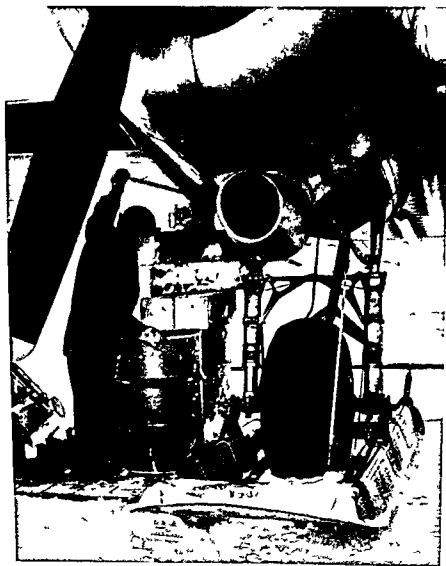
Sun Ringed with Rainbow Halo

The purple color of the heavens was especially striking and apparently has not been elsewhere recorded. The psychological impression was one of infinite coldness. There was no roof of blue between earth and the absolute zero of empty space between the stars.

The strange sky color presumably was due in part to the almost complete absence of dust particles in the Antarctic atmosphere.

There were rapid, radical temperature changes, such as a rise of 18 degrees in one hour without any variation in the wind direction.

Several 'ice fogs' were observed. In appearance these do not differ notably from



Ski wheel Landing Gear Enabled the R4Ds to Take Off from a Carrier and Land on Snow

Only three inches of wheel protruded through the ski, since more would have meant serious danger of a crack up at the end of the flight from the *Philippine Sea* (page 444). It was the first time such a ski wheel take off had been attempted from a carrier. A ground crew member is jacking up the plane preparatory to removing the wheels for operation in Antarctica.

ordinary white fogs, but through them one sees rainbowlike halos around the sun. These are due to aggregations of billions of extremely minute ice crystals in the air close to the earth.

Two cradles of cyclones for Antarctic regions, which indirectly, it is probable, affect most of the world south of the Equator, were located. Cold air off the Polar Plateau sweeps northward from western Victoria Land near the South Magnetic Pole. It crashes into warm north winds somewhere near the Balleny Islands and 'baby' cyclones are born.

These grow rapidly, sweeping eastward across the Ross Sea, and finally decay in the

Rockefeller and Queen Maud mountains.

The other cradle is probably near Mount Ruth Siple, on the western edge of the Amundsen Sea. Here apparently the cold polar air sweeps through some wide gap in the mountains and encounters southward-blowing winds. Thus again cyclones are created which move eastward, gathering strength, and finally decay somewhere over the Palmer Peninsula.

This accounts for the origin of major storms in two of the four quadrants into which, for convenience, Antarctica ordinarily is divided.

Several minor areas of storm center activity also were found by the Eastern and Western Groups operating in the other quadrants. Location of all, with the establishment of adequate observing stations, would simplify Antarctic weather forecasting for future expeditions.

"Blue City" of Southernmost Mammals

A few miles from the base, hidden among blue ice grottoes, was a large colony of Wed-

dell seals (page 501). These drowsy giants are the world's southernmost mammals, and this infernal region of pressure ice in the Ross Shelf, always suffused by a strange blue light and traversed by deep, hidden crevasses, marks the southern limit on earth of warm blooded mammals.

For the seals it is a permanent summer and winter home. Hundreds were counted by air surveys conducted from the base. They ordinarily live beside holes in the ice which give them access to deep Ross Sea waters for fish, their staple food. When these holes freeze over several inches thick in early autumn, the

creatures cut windows through the ice with their teeth

Dr Alton A Lindsey, assistant biologist of my second expedition to the Antarctic, watched these seals at work. "Swinging the entire head from side to side," he reported, "with the mouth held open at an angle of 150°, they cut a double groove by use of the canines (and perhaps incisors also) of both jaws"

In winter these strange animals disappear, but they do not desert their "blue city" They apparently huddle on ledges on the sides of the crevasses all the winter night, with temperatures as low as 70 below outside They supposedly have access to the sea at most times On the snow they can outrace a man, but ordinarily show no fear

The animals seem complete masters of their harsh environment When fish are plentiful they store enormous amounts of blubber to sustain them in hard times Females, for example, eat nothing for a week after pups are born, but, drawing on this blubber for food, are able to give enough milk for a single pup to gain as much as seven pounds a day

There was some speculation as to whether the ice drift had not carried their home canyon among the crystal mountains too far away to allow them further access to the sea In that case, they would be doomed to slow death from starvation

This can be determined only by a later expedition It seems improbable however that such naturally intelligent animals with instincts built on countless generations of experience with ice, would have allowed themselves to be trapped in such a fashion The blue city it is most likely, remains their home and not their prison

Two Geographic Ghosts Are Laid

On the edge of the Antarctic sonic depth findings confirmed the nonexistence of two century old phantom lands in the positions previously reported for them

First were the 'Numrod Islands,' at latitude 56 30 south and longitude 158 30 west They first were reported by Capt Henry Eilbeck in the *Numrod* in 1828 after his ship had been blown off course during a passage around Cape Horn He described high mountain peaks hosts of birds, and fields of marine vegetation in the water

On our expedition the ships *Yancey* and *Merrick* made radar soundings over a 20 mile radius around the reported position They found only ocean about two miles deep

The second ghost laid was 'Swain's Island,' in latitude 59 30 south and longitude 100 west

It apparently was the ice born hallucination of the Nantucket whaler Jonathn Swain who in 1809 recorded the position of a large island surrounded for miles by fields of red water due to the presence of minute crustaceans known as "krill," which concentrate in colonies of countless trillions They usually indicate that land is somewhere in the vicinity

Here also the expedition's depth findings showed only water two miles deep

Both Eilbeck and Swain may have seen exceptionally large icebergs drifting slowly northward, eventually to disintegrate in the warmer waters of the Pacific

Sometimes these are enormous In January, 1927, for example, the Norwegian whaler *Odd I* passed a tabular iceberg the area of which was estimated at 10,000 square miles, or approximately the size of Maryland

Another explanation is that both ship captains were victims of mirages They presumably were too far north to have observed much horizon 'blink,' the magnified reflection of ice formations against the sky, in whose fantastic configurations anybody is likely to see anything, from the skyline of New York City to an island in the mid Pacific forested with fronded palms

Certainly there was no suggestion of charlatanism about the 'discoveries' They were reported merely as matters of routine before the day when scientific methods of observation were well established

16 ton Tractors Make Six-day Journey

A six day land journey into the Rockefeller Mountains and return, a total of 280 miles with two 16 ton amphibian tractors was one of the most important experiments, as regards future exploration in polar regions, conducted by the expedition

The party was led by Capt Vernon D Boyd of the U S Marine Corps, a veteran of Antarctic exploration (pages 481, 489)

The immediate objective was to establish a gasoline cache and weather station for the planes but of significance also was the test of the possibility of using specially equipped heavy tracked vehicles for long overland journeys, such as a conceivable march from the Bay of Whales to the South Pole

Such a journey would be beset by many unpredictable complications Transportation has been the nemesis of south polar expeditions in the past with dog teams generally recognized as the most reliable means for long incursions into the interior But this is the gasoline age Sooner or later some explorer will motor overland to the Pole

Our previous expeditions have experimented



Tons of Ice Break from the Ross Ice Barrier Almost at the Photographers' Feet

Cracks in the foreground emphasize the danger of coming so close to the barrier's face here about 80 feet above the water and broken ice of the Bay of Whales. O. F. Bowe, Chief Photographer's Mate, is ready to beat a quick retreat as he peers over the brink. The dark area at upper left indicates a "water sky" reflected from the Ross Sea.

with motorized transport across the endless wastes of thick crusted and sandlike neve with indifferent success but each failure where we recognize our mistakes can be regarded as a step forward.

Our heavy tractors exerted a pressure of about $12\frac{1}{2}$ pounds per square inch, or more than three times the maximum permissible. The two carried seven men and their gear—a load of nearly 3,000 pounds—on the Rockefeller Mountains trek.

Gasoline, food, and equipment sufficient for three months in case the party became marooned were carried on heavy sleds. Two were dragged behind each tractor.

The vehicles averaged seven miles an hour, moving steadily a quarter of a mile apart. The party traveled almost directly eastward over the ice of the Ross Shelf.

It was a region beset with death traps for heavy vehicles. These were wide crevassed

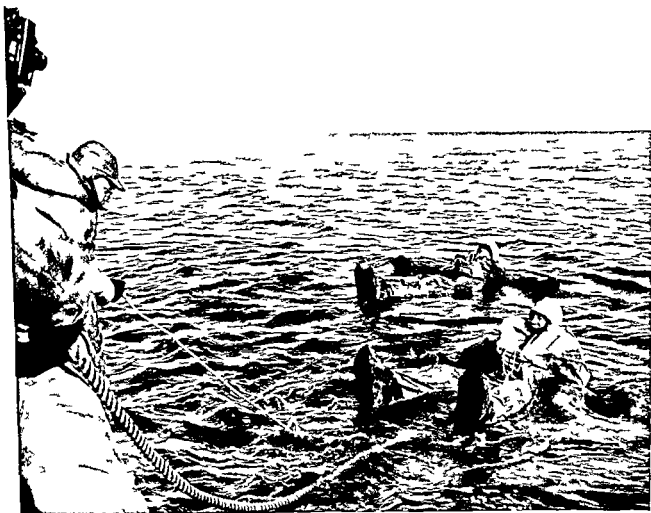
areas where the great chasms in the ice were concealed by thin snow bridges.

Problems of visibility and navigation were important from the first. The sky was overcast nearly all the time. This resulted in a condition of shadowless low visibility in which it was impossible to detect the parallel ridges in the snow which indicate crevasses.

Nevertheless, only once did a tractor break through a snow bridge and then, fortunately, after it had straddled the chasm.

Mirages Paint Horizon with Illusion

Throughout the six days the sun was visible for only three hours, so Captain Boyd had to navigate entirely with the magnetic compass, which is highly unreliable in the Antarctic. The experience must be given due consideration in plans for any future tractor incursion deep into the continent. Boyd recommends some sort of gyrocompass.



Such Warm and Buoyant Suits Save Lives in Freezing Seas

Life saving immersors on suits are tested in water at a temperature of 29 Fahrenheit on Washington's Birthday. Quickly donned over ordinary clothes they were used extensively during the war to save the lives of torpedoed merchant seamen.

Perhaps the most interesting feature of the trip was the continuous panorama of mirages. All one day great walls of cream colored and dark blue icebergs loomed ahead of the tractors. Sometimes they would merge into a solid blue wall. It seemed as if the party rapidly was approaching an iceberg filled sea.

Actually this was a projection against the sky of Okuma Bay which cuts into the Ross Shelf Ice about 60 miles to the north.

At the end of the route a party climbed Mount Helen Washington for geological specimens and a visit to the seismograph station set up by the last expedition. There they rescued two marble slabs used by Roy G. Fitzsimmons as a base for his instruments. Boyd brought them back with him as a possible base for a memorial to Fitzsimmons who was killed in the war.

As a result of the trip Captain Boyd was convinced that even the 16 ton tractors with certain improvements could be used for a

much longer trek, even to the Pole itself. It would be necessary to provide heat for the space occupied by personnel and some sort of living quarters.

With the vehicles in their present condition Captain Boyd points out the trip would have been impossible earlier in the season. The tractors' ground pressure was too great. By mid February however the surface of the neve had hardened. Even so the machines sank from eight to ten inches over soft areas and probably would have bogged down over any great distance.

Scott's Camp Perfectly Preserved

Antarctica is an ageless land where nothing except the physiological system grows old. This hardly could be better illustrated than by the camp of Scott's 1901-04 expedition on Ross Island at McMurdo Sound where Admiral Cruzen landed late in February from the icebreaker *Burton Island* to survey the



For the First Time in History, Men Land on a Lake in Antarctica

Furrowing the blue green water is one of the wing floats of the Martin Mariner seaplane which alighted in the midst of the remarkable "oasis." Beyond rise icebergs and bare brown hills where a superficial survey failed to disclose any visible sign of life (Plate VIII and pages 475 and 499)

possibilities of establishing an auxiliary base.

Scott's camp might have been abandoned only a few weeks ago. The prefabricated cabin which the explorer had brought from England still stood in perfect condition. The timbers looked as if freshly sawn. Printed directions for putting them together, which were found pasted on one wall, might just have come from the press.

A hitching rope which Scott had used for his ponies was so completely undeteriorated after 43 years that it was used without hesitation to secure the helicopter in which Admiral Cruzen had flown from ship to shore. A few sealskins scattered about looked new. Car tons of biscuits still were edible, although rather tasteless.

And there was the "latest news." A Russian army was invading the Pamirs, according to the headlines of a British news magazine found in the ice. Paper and print looked as if the publication had come from the press only a few days before. But this journal had been printed in 1892.

Scott's 1911 camp at Cape Evans, on the western shore of Ross Island, from which he set out on his ill-fated journey to the South Pole, was also visited by task force personnel.

It appeared somewhat disorderly after the buffetings of 35 winters. Snow had drifted through cracks in the planks of the sealed cabin. Straw and debris were strewn over the nearly ice-free volcanic ash.

The frozen carcass of a dog stood on four legs as if it were alive. Seal carcasses from which fresh steaks might have been cut lay about. Scattered around the cabin were car tons of provisions, still good to eat. A box of matches ignited easily.

Just west of this camp the great Ferrar Glacier, one of the most impressive sights in the Antarctic, rises 7,500 feet through the mountains. Two graves on a hilltop are covered with beautifully colored volcanic ash. Steam came from the crater of three-tiered Mount Erebus on Ross Island (page 476).

Killer Whales, Seals, and Penguins

An unusual abundance of the dreaded orcas, or killer whales, was found in McMurdo Sound waters, and brown cliffs of the shore were covered with seals and penguins.

The season was so near its end that plans for an auxiliary base were abandoned. The area remains one of the best possible for an expedition headquarters.

This expedition was so large that I have had difficulty in condensing its story into a magazine article—even one as long as this. Thus there were many outstanding men and officers to whom it has been impossible to give the credit they so richly deserve. This has disturbed me, even though I realize that it would require several volumes to describe adequately a 4,000 man expedition. However, since I have covered the expedition by groups, I should be remiss not to mention two the veterans of our former expeditions and the representatives of the press and radio.

11 Correspondents, 12 Antarctic Veterans

There were nine members of the press and two radio commentators. The three great press associations—several large newspapers, and the major broadcasting systems were represented.

I was not used to so many reporters. On each of my other expeditions I had had only one, and he carried on also as a member of the expedition. So I wondered how it was going to work out with 11 of them.

I soon found out. By the time we got settled at Little America I had seen enough of the men of the press to know that I could look upon them as true and loyal members of the expedition. They were thoughtful and considerate, and as square a group of men as I had ever in all my long career come in contact with in any walk of life.

At Little America I lost all desire to censor anything the correspondents wrote. Their judgment and craftsmanship were such that I didn't even check their stories for accuracy.

These 11 correspondents renewed my faith in our free press and I am human enough to be very grateful to them.

Our personnel included 12 veterans of former expeditions. Since this was a naval expedition it was not practicable to take more.

They supplied to the expedition such technical knowledge of Antarctica as the Navy lacked. Officially their contribution was inestimable and personally it was a joy to have them with us. They were all at Little America but Admiral Cruzen who was taking the ships north and Jack Perkins biologist who had broken his leg.

We used to meet at least once a day in what we called the veterans tent. Of course we knew a lot about each other and the razzing that went on there. I am certain was a world's record.

They were all tried and true men or you may be sure they would not have been along. Many of them have been mentioned elsewhere in this article.

They were, in addition to Cruzen, Siple and Perkins, Waite, Boyd, Dustin, McCoy, Lt C C Shirley, USN, Richardson, A J L Morency, chief warrant officer, US Army, Capt M W Weiner, US Army, and R R Johnson, chief boatswain's mate.

We evacuated Little America on February 23, 1947, and the ships of all three groups left Antarctic waters early in March. The polar winter had started making highly perilous and impractical any further air exploration.

The expedition had been on the whole highly successful.

The returns from an expedition sufficient to have financed the war for only a few months had brought a notable advance in man's knowledge of the planet on which he lives, a contribution for all time to come.

Still much of the continent remains unknown. There are many secrets behind the glittering ice ramparts and the painted white curtains of fog and gale tossed snow. The final conquest of Antarctica remains perhaps for another generation of explorers.

What value has Antarctica to repay such effort and expense as was involved in this expedition? This so frequently is asked that it deserves a frank answer.

At the outset, it may be stated that, in terms of any financial return now or in the immediate future, it has no value whatsoever. Perhaps this will be a sufficient and conclusive reply to many of the questioners.

One day it is quite possible somebody will make money out of the bottom of the world. We know for example, that there are huge reserves of coal there. The black mountains are full of it. It is impossible at the present stage of exploration even to make a wild guess as to the extent of these deposits.

But any mining operations especially when we consider the difficulties of transport, would be fantastically impractical at this time. There may come a day, however, when the world will need this coal.

Almost certainly oil will be found under the ice. It is impossible to imagine a large continent without vast mineral wealth of many kinds buried in its rocks.

The Antarctic a Proving Ground

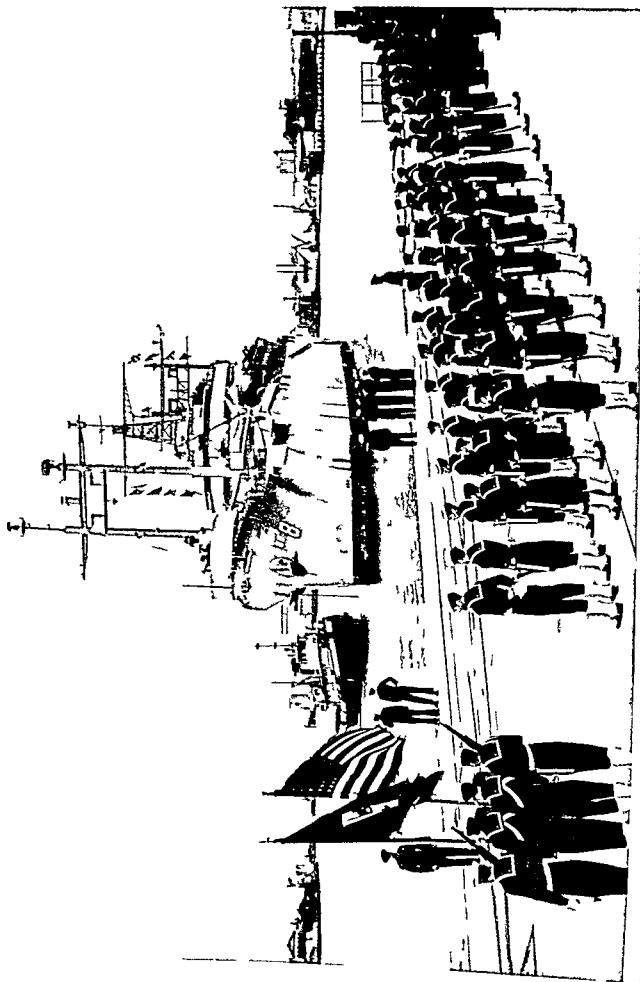
For the Navy's own purposes, much was learned about celestial navigation and ship operations in polar regions.

On this expedition the Navy equipment and personnel were subjected to the worst possible conditions. We operated deliberately late in the Antarctic season. It was an excellent opportunity to meet and learn how to overcome many situations which certainly will be en-



With an Icy Bone in Her Teeth the *Northland* Smashes Out a Basin in the Bay of Whales

The bay was found completely frozen over and the Coast Guard icebreaker spent three days clearing a room for the other three ships. With ice walls looming above the bow of the cliffs of the Ross Barrier



From the Bay of Whales to Washington D C Bluejackets and Marines Form an Honor Guard to Greet the Flagship *Mount Olympus* as a Yard Craft Nudges Her to the Pier at the Naval Gun Factory



Staff Photographer J. H. F. Flaherty

When Being Introduced Mr Penguin Looks the Other Way

Rear Admiral Byrd shows Secretary of the Navy James Forrestal a macaroni penguin captured by the crew of the Coast Guard icebreaker *Northwind* on sub-Antarctic Campbell Island south of New Zealand and brought to Washington, D. C. on the *Mount Olympus* for the National Zoological Park. Several penguins escaped before they were taken off the ship and some started swimming down the Potomac River presumably on their way back home. For a week they eluded all efforts at recapture.

countered if it ever becomes necessary to carry on actual warfare in polar regions.

It has been stated many times in the past year that, as the world continues to shrink with an ever increasing acceleration the North Polar Basin the shortest route between the Eastern and Western Hemispheres is bound to be an important strategic area and battleground in any future major conflict.

The United States owns no land areas sufficiently far north to utilize as an adequate proving ground for the most severe Arctic conditions. Even the northernmost point in

Alaska is more than 1,200 miles south of the North Pole.

Our Army and Navy must be trained to cope with the severest conditions they may be subjected to in any possible emergency.

Any severe natural conditions ever likely to be met in the Arctic are more than duplicated in the Antarctic. Life is far more difficult here. The temperature averages about forty degrees colder the year round. The winds are the most violent and constant in the world. Much of the region is without landmarks of any sort.

Men who have sailed ships, flown planes or carried out any sort of military operation south of the Antarctic Circle will find nothing to baffle them in the Far North.

Foods Could Be Stored Indefinitely

One reason weather conditions are so very much more severe in the Antarctic than in the Arctic is that there is a comprehensive ice age at the bottom of the world.

It has been suggested that the great bowl of the continental plateau some day may serve as

a gigantic food refrigerator where surplus crops can be stored indefinitely—perhaps under a world trusteeship—until needed. There is little possibility of spoilage or insect depredations. This might prove a stabilizing influence in world affairs. Here again must be surmounted the physical obstacle of transportation.

I dislike to think of money in connection with Antarctica. It has higher values. This continent and these seas can be looked upon as Nature's most sublime work of art. They are poetry, music, painting, architecture, and philosophy all combined.

There are no paintings on earth such as those which the cosmic artists execute daily on canvases of green and purple sky with pink, white, and yellow cloud patches and murages of fairy cities and glittering cathedrals raised out of the diamondlike ice.

There is no other music like the toneless music of millions of years of accumulated silence through which come bars of unearthly colors. There is no need for ears to hear the fugues played on this ice organ.

Here Nature has set aside for man a domain of beauty and inspiration such as he cannot find elsewhere on this planet.

I have known few who have gone south of the Antarctic Circle who have not been raised out of themselves for a time into smoother realms of thought. Here is a door ajar through which one may escape a little way and for a short time out of our little world from the noise and chaos of civilization into the silence and harmony of the cosmos and for a moment be a part of it.

But this chance to escape is not the greatest value of the immensity of lifeless whiteness over which the Southern Cross floats high in the sky. This greatest value is an intangible and certainly inexpressible spiritual value.

Antarctica a Sermon in Ice

The vastness, clearness, whiteness, silence, the purity, the elevation above the petty quarrels and ambitions of men and nations combine to form a majestic symbol of what man should want most: peace on earth.

Antarctica is a sermon in ice. But there is also malevolence in the nature of things down there at the bottom of the world, just as cruel and sinister as its beauty is harmonious.



'Don't Take It So Hard, Old Man'

Jack Perkins, expedition biologist, stuffed frozen fish down the gullets of captive penguins for two weeks before they would eat voluntarily. Here he calms an emperor penguin's frayed nerves before starting the feeding operation.

A summer visitor could not know much about this nor would he have the antithesis—the long winter night—to lend emphasis to the beauty of the Antarctic spring and summer.

But antithesis is not enough. The beauty of Antarctica cannot become entirely yours just for the seeing of it alongside its ugliness any more than the harmony and peace are all yours just for the taking of them. There is no easy way. They have to be won. They have to be fought for. You have to go up against the elements of Antarctica to attain them fully.

And so we see that it is the great Nature-made contrast of good and evil there that enables you to see and value the good, but



Staff Photographer B. Anthony Stewart

Safely Home, Admirals Byrd and Cruzen (Right) Receive the Navy's "Well Done"

At Washington D. C. Secretary James Forrestal gives Admiral Byrd a warm handclasp while Fleet Admiral Chester W. Nimitz, Chief of Naval Operations (left) awaits his turn. The greeting followed docking of *Mount Olympus* at the Naval Gun Factory on April 14, 1947 (page 519)

also that it is fighting the evil that enables you to possess the good, with its principal elements, harmony and peace, within yourself

Antarctica's Eternal Challenge

When some of our men visited Scott's 1911 camp at Cape Evans, they found there among the wreckage wrought by the storms of 35 winters a corked copper cylinder. Inside was a single sheet of ruled school theme paper. Upon it was written:

'Sacred to the memory of ———, ———, ———' All three had been members of Sir Ernest Shackleton's 1914-17 expedition, part of which had wintered there. Two had dis-

appeared during a blizzard on the ice pack, the other had perished on the trail. The names were followed by a few lines from Robert Browning:

I was ever a fighter so—one fight more
The best and the last
I would hate that death bandaged my eyes,
and forbore,
And bade me creep past

There can be no more fitting expression of the guiding faith of the Antarctic explorer today and tomorrow. The great mystery of the South ever challenges to one fight more, and here death, dressed in storm, darkness, and cold, bandages no man's eyes.

The Society's New Map of the Caribbean Area

GREATLY increased geographic knowledge acquired by American airmen on wartime flights over the Caribbean area has enabled the National Geographic Society to map this important region in far more detail than ever before. The result is the 10-color map, "Countries of the Caribbean," which accompanies this issue of the NATIONAL GEOGRAPHIC MAGAZINE.*

Just 455 years ago this month, Christopher Columbus made his first discoveries here, groping among the islands off the slender west line of the Western Hemisphere and thinking he was off the coast of Asia.

Since that time, many explorers, geographers, navigators, buccaneers, treasure hunters, and fishermen—even hurricanes and volcanic eruptions—have altered the geographic picture. But it remained for the modern aerial camera to give new distinctness and accuracy to coastlines, river courses, and mountains almost everywhere south of the Rio Grande.

The Cartographic Section of the National Geographic Society worked six months to epitomize the four and a half century accumulation of facts on this 41 by 25 inch map for The Society's 1,600,000 members.

Insets Show U S Possessions, Bases

Extending from Mexico's Tijuana to the mouths of the Orinoco in Venezuela, the new map area includes a slice of the southern United States as well as all of Mexico, Central America, and the West Indies—a winter vacation land of tropical greenery, deep blue water, and glistening coral sand.

Of its 6,954 place names, few would be recognizable to Columbus. One would be San Salvador (Watling Island), in the Bahamas, where the discoverer and his men first landed in the New World, bearing the Admirals' Green Cross banner and the royal standard of Spain. Kneeling upon the shore, they gave thanks to God and kissed the ground with tears of joy, for the great mercy received.

Where Columbus found only a few Indians and cruised along virgin verdant coasts today are populous republics with millions of people—and not a single possession of Spain.

As a master mariner headed for the Orient he would doubtless be most interested in the Panama Canal, dividing the land and uniting the world. The Canal Zone inset on this map shows the projected third lock system intended to accommodate larger ships and make the vital artery less vulnerable to attack.

This large scale inset is one of eleven which highlight areas of special interest. In one corner appear the Caribbean possessions of

the United States—Puerto Rico, the Virgin Islands (two insets), and the Canal Zone. In another are insets of islands on which the United States has military bases—Cuba and the six islands on which the British granted us bases in 1940 in exchange for badly needed destroyers. Trinidad, Jamaica, Exuma, St. Lucia, Antigua, and Bermuda.

In the patrol which met the challenge of Axis submarine warfare, every square mile of the "American Mediterranean" was combed by air and sea again and again.

Most of the land area is now covered by United States Army Air Forces trimetrogon photographic surveys made in cooperation with the local governments. Results of these and of many new ground and sea surveys are incorporated in The Society's map.

Pilots will note much new information concerning altitudes of mountains. For example, two elevations of 8,202 and 10,301 feet are shown in the Dominican Republic, where earlier Caribbean maps show 5,543 feet as the highest definite peak.

In western Venezuela are peaks of 15,321 and 16,427 feet. Older maps show 13,864 feet as the maximum height of the Cordillera de Merida.

A unique mountain is Mexico's amazing Parícutin, the young volcano which has sprung from a cornfield on a 7,500-foot plateau in the State of Michoacán to a height of 9,000 feet above sea level and is still growing†.

The map incorporates new census material from Mexico, Cuba, Jamaica, and the Bahamas. All four have increased sharply in population. Mexico 1930—16,552,722; 1940—19,473,741; increase 17.7 percent. Cuba, 1913—3,962,344; 1943—4,778,583; increase, 20.6 percent. Jamaica 1921—858,118; 1943—1,237,063; increase 44.2 percent. Bahamas 1931—59,808; 1943—68,846; increase, 15.1 percent.

A new boundary, agreed upon after nearly 50 years of arbitration, divides Costa Rica from Panama. The treaty was concluded on May 1, 1941, and President Roosevelt sent both governments a message lauding the settle-

* Members may obtain additional copies of the new map "Countries of the Caribbean Including Mexico, Central America and the West Indies" (and of all standard maps published by The Society) by writing to the National Geographic Society, Washington 6, D. C. Prices in United States and Possessions 50¢ each on paper, \$1 on linen. Index 25¢. Outside United States and Possessions 75¢ on paper, \$1.25 on linen. Index 50¢. All remittances payable in U. S. funds. Postage prepaid.

† See Parícutin the Cornfield that Grew a Volcano by James A. Green, NATIONAL GEOGRAPHIC MAGAZINE, February, 1944.

ment The new boundary was actually demarcated on September 15, 1944

For the first time accurate boundaries of the Senatorial Districts in Puerto Rico are marked This boundary delineation is based on the work of a Puerto Rico planning commission using a map completed by the U S Geological Survey in 1943

Projection Tuned to Air Age

For this map your Editor and The Society's cartographers chose the Transverse Mercator projection

The ordinary Mercator projection may be considered as developed mathematically upon a cylinder tangent to the spherical earth around the Equator For some 15 degrees on each side of the Equator, such a cylinder closely approximates the actual surface of the sphere, so that the scale change or stretch is at a minimum

In using this projection in transverse, or oblique, form, as is done on the new National Geographic map we may consider the cylinder as tilted on the sphere so that its line of tangency is no longer the Equator but some other great circle of the cartographer's choice *

In this map the great circle which forms the axis of the projection has its vertex at 20 north latitude and 87 west longitude From there it runs in a straight line across the map passing just north of Mexico City and San Juan Puerto Rico

Like the Equator in the conventional Mercator projection, this is the line of zero deviation in scale Since all parts of the map lie within 15 degrees of this line, the scale variation is slight, reaching a maximum of 3½ percent along the top and bottom borders of the map Through the whole central area the scale change is negligible

THE NATIONAL GEOGRAPHIC MAGAZINE in 1921 pioneered in the use of the Transverse Mercator for mapping a long airplane flight, and today the projection is widely used for great-circle flight strip maps It is admirably suited for general maps of certain areas and was used for The Society's Southeast Asia map (October, 1944)

Important to the navigator at sea or in the air is the fact that, in addition to reducing the scale variation to a minimum, this projection maintains strict conformality—that is in any small area of the map the scale is the same in all directions and every place is in its true direction from every other place

Roads railways and commercial airports are shown throughout the area The entire Inter American Highway, as the Mexican Central American section of the Pan American

Highway is called, is indicated by an emphasized red line, with uncompleted sections dashed

There are now only two impassable stretches between Laredo, Texas, and the Canal Zone One of these begins at Trinitaria, in south eastern Mexico, where a 150-mile section running into Guatemala is now under construction The other impassable stretch of 120 miles lies in Costa Rica and Panama

From the Canal Zone eastward there is no road beyond Chipo The section through the Darien Peninsula has not been traversed or surveyed From the Canal Zone the motorist must ferry across to Barranquilla or Buenaventura, Colombia, or La Guaira Venezuela

All of the Central American countries are carrying on highway construction projects, but rugged mountains and steaming jungle make roads hard to build and defend against encroaching Nature

Ninety International Airports Now

Air transport in this region has increased remarkably In 1939 there were about 50 airports in the Caribbean area with scheduled international service Now this number has grown to 90

Also, a number of local air services have been established in the area Planes now haul horses cattle, lambs chickens, and many other creatures from fish to chinchillas Industrial equipment is flown to hitherto inaccessible areas and products are shipped out by plane Frog legs from Cuba and many perishable tropical delicacies now are flown to United States markets

One cargo of specially processed coke was flown from New Jersey to Cuba so big sugar mills could keep going in a fuel emergency

The war caused a tremendous boom in Latin American production of minerals and such products as rubber, abaca (Manila hemp), guanine, rotenone tung oil palm oils cork, and kapok ordinarily obtained from distant parts of the earth

If the war tore much of the rest of the world to pieces, it emphasized the interdependence of the American republics and that dependence upon one another comes to a focus in this area which encompasses the Caribbean highway between the Americas and the approaches to the Panama Canal

* For an illustrated description of this projection see *The Round Earth on Flat Paper* by Wellman Chamberlin National Geographic Society cartographer Copies of this work an introduction to map projections are obtainable from the Secretary National Geographic Society Washington 6 D C., at 50¢ each in the United States and Possessions else where 60¢ Postage is prepaid

Guatemala Revisited

By LUIS MARDEN

ELEVEN years ago I went to Guatemala to make photographs for the NATIONAL GEOGRAPHIC MAGAZINE. At that time, equipment for making color pictures was cumbersome—we used big glass plates and a tripod camera. Exposures were slow; subjects had to hold it for one tenth to one half second. Nothing that moved very fast could be photographed.

Recently I went back. This time I could make color pictures in split fractions of a second, catching the fleeting smile or frown and record the bustling life of crowded market places. Plates in the following pages show some of the photographs I made.

Guatemala begins at the Mexican border with a vast jungle area, where chicle tappers slash forest giants, but most of the Republic's people live in the *Altos* or Highlands in the shadow of sleeping volcanoes.

Highlands Little Changed, Capital Modern

The Highlands of Guatemala have changed little in four hundred years, but I found that the capital Guatemala City, had expanded since my 1936 visit. Virtually surrounded by deep ravines, the city has stretched suburban tentacles out between the fissures. Old trough-shaped cobbled streets have given way to asphalted avenues and splendid new buildings such as the magnificent National Palace (pages 530-559) rise from colonial foundations.

Sixth Avenue is the Fifth Avenue of Guatemala City. Here a race that was old when Cortes came to the New World presses its brown nose flat against plate glass windows displaying products of the machine age. Brightly dressed Indians carrying loads of wood or vegetables trot unnoticed among smartly dressed Guatemaltecos.

Though pure-blooded Indians form more than half the population of the Republic, Guatemala City is the most metropolitan capital between Mexico and the South American mainland. High in a valley nearly 5,000 feet above sea level, the spotless city has a spring-like climate the year round.

Aromatic highland coffee forms the country's chief export, while among Indian small farmers corn remains a staple subsistence crop. Certain scholars think that the New World's pre-Columbian agriculture—which was based on corn—may have been born in Guatemala, for here grows *teosinte*, a wild grass allied to maize.

Realizing the importance of agriculture and animal husbandry to Guatemala, the United

States sent as its Ambassador to the Republic Edwin J. Kyle, former Dean of the School of Agriculture of the Agricultural and Mechanical College of Texas.

Mr. Kyle has arranged visits between agricultural experts of both countries. Students come from Guatemala to the United States on scholarships to study farming and cattle breeding.

'You're My Half a Life'

In writing of Latin America, I have tried to record some of the graphic phrases and turns of speech in each country. I found Guatemala no less imaginative in the use of metaphor than its neighbors.

For example, if your Guatemalan girl friend says you are 'half a life,' she is complimenting you, not ridiculing your lack of vitality.

A Guatemalan monologue might go like this: 'Miguel over there is a long one, but as he has a lot of neck, he never puts himself in a shirt eleven yards long. At lunch today he was with 80,000 devils because the chicken we ate defended itself so well. But that wool is for the tiger now, though his cronies still think he is half a life.'

This means Miguel over there is a sharp customer, but as he has a lot of pull, he manages to keep out of tight spots. At lunch today he was furious because the chicken we ate was so tough. But that rascal is all washed up now, though his cronies still think he is wonderful.

Jose Milla, an author of the last century who lived in La Antigua, created the character of Juan Chapin, Guatemala's common man, and through him explains many of the colloquialisms of the language. Milla also wrote historical novels of colonial times, and Guatemalans revere him as the official recorder of national tradition and history.

When Guatemala was the seat of government of all of Spain's Central American provinces, the old capital, now called La Antigua, became a rich, cultured center of the church, arts and letters. Twice destroyed by earthquake and flood, the Very Noble and Very Loyal City of St. James of the Gentlemen of Guatemala was demolished for a third time by earthquake in 1773. Three years later the capital moved to its present site.

Higher and colder than the new city, La Antigua has a savor that is hard to put on paper (pages 531-549-550).

People still live serenely in the old town that half sleeps in the bright sunshine of the



© National Geographic Society

Kodachrome by Luis Marden

When Boys Meet Girls in Santiago Atitlán, Few Turn to Look

Men and women tend to form separate groups during Indian celebrations as on this day of St. James Atitlán's patron. Men usually wear white shirts, youth on left wears colored shirt from neighboring San Pedro. Atitlán women often knot small purchases in ends of scarf. Black volcanic rock furnished material for the yard fence (left)

Valley of Panchoy. Wild flowers grow in cracks opened by earth tremors in the massive walls of convents and churches. Half fallen arches frame the peaks of the volcanoes Agua (Water) and Fuego (Fire)

Earth Restive in a Serene City

Periodically the earth shudders to remind residents why their ancestors left the city. When I was in Antigua, Fuego Volcano always steaming began to thunder and spill incandescent lava from its yellow stained mouth. Violent explosions blew away part of the crater wall. From Alotenango, a village just under the bulk of the 12,854 foot high mountain, spectators at night watched the devil's dance of glowing lava streams as blood red and fiery orange fingers of lava snaked slowly down the flanks of the volcano and low lying clouds of steam reflected a dancing glare (page 528)

Old bells are the voice of Antigua. Belfries of sixty odd ruined churches speak in cracked, thin voices or deep, booming tones.

Antigua speaks more softly with flowing water. When Government excavators uncovered terra cotta pipes which conducted mountain water to supply fountains and household needs, water was turned on, and old houses live again as the icy mountain water runs through their veins.

Nearly everywhere you hear moving, murmuring water. It falls into deep basins with distinct notes as musical as glass bells and rushes through open conduits with a susurrus as of wind in the pines above the city.

Town Characters

Into a fountain in the tree-shaded Plaza de Armas at the town's center, effigies of women discharge streams of water from their breasts.

Yellow Sulphur Streaks the Sides of Restless Fuego (Fire) Volcano

Southwest of Guatemala City the active vent is the lower of twin peaks. The higher 12,989 foot Acute nango has a cold filled tip crater. Shortly after this photograph was made a violent eruption blew away part of the sharp edged crater walls at left. Solid sulphur condenses as yellow patches beneath steam jets

into a catch basin. As I sat on a bench near the fountain one day, a friend pointed out town characters to me.

Indicating a man who walked with a limp, rising and falling at each step my companion said, "There goes the Can Opener."

When I commented on the good looks of a passing girl he shook his head. "Yes, she's good looking but that's all. Lacks appeal. We call her 'Cafaspirina' [a popular brand of aspirin], because she does not affect the heart."

But a dark-eyed girl who sat opposite us with a girl friend had plenty of spirit and character. To a bell-bottomed trousered dandy who spoke and leered at her as he passed she snapped, "Honey was not made for a buzzard's beak!"

Close to the Plaza stands the iron-barred yellow house of Bernal Diaz del Castillo. A soldier with Cortés on the conquest of Mexico in 1519, Bernal Diaz fifty years later wrote down all he remembered (which was practically everything) of that saga of Spanish arms. By then he was an old man, living in

Guatemala on land allotted him as one of the original conquerors of New Spain.

The bulky manuscript, in the old soldier's hand, is carefully preserved in Guatemala City's City Hall. When I first turned the yellowed pages of the account ten years before, it made me want to see for myself the route followed by Cortés.*

While I read the tablet in the wall of Bernal's house a man standing in the door said, "Would you like to come in?"

Showing me a niche in the wall he had discovered when remodeling the house the present owner said. Perhaps the old man kept his writing materials here.

He told me of Antigua's history, and when I commented on his knowledge he said, "Of course, but I have many other interests. I am—he drew himself up—a tailor, farmer-beekeeper, and philharmonic musician."

Tilemakers of Spain brought their art to Antigua. They covered walls, fountains, and

* See "On the Cortés Trail" by Luis Marden, NATIONAL GEOGRAPHIC MAGAZINE, September, 1940.



© National Geographic Society

Photographed by Helen S. Williams

Business as Usual During Baby's Lunchtime in Solola Market

In most villages Indian mothers nurse their children through one wide sleeve. The turkey (right) was already domesticated in the America that Spaniards conquered. Introduced into Europe, domesticated turkeys returned to North America with English settlers.

benches with tiles in gray, blue and yellow. Today an Antigua potter carries on in the old tradition.

I copied some of the mottoes painted on square tiles and water jars and pitchers:
I am Yours Pretty One Do not Tempt Me
Heavenly Face Dreaming of Love
I Die for You I Dreamed that You
Loved Me and an anticlimax in tile: To Love You Is a Pleasure.

From the patio of a house that an old friend, Mildred Palmer, rebuilt in its colonial splendor, I could see the green cone of Agua driving its verdant wedge into the sky above the carved stonework of the fountain.

Indians Weave Fine Textiles

Guatemalan natives, as the Indians call themselves, excel in the weaving of textiles. The Palmer collection of native costumes and fabrics includes examples from nearly all of the 250-odd villages.

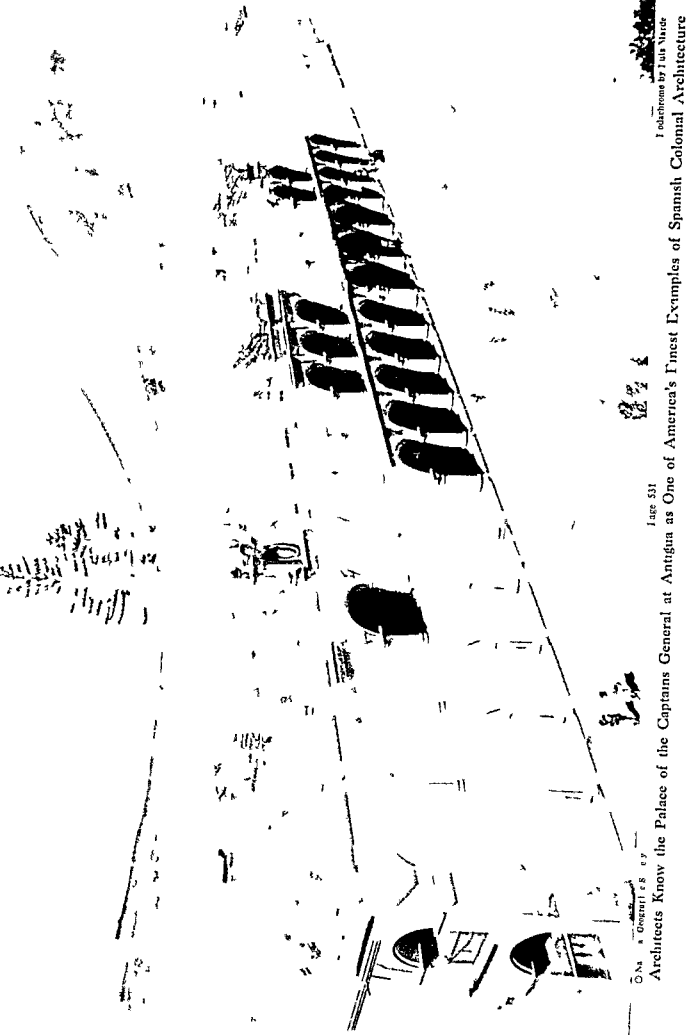
Before the coming of Europeans to the New World, Indians worked only in cotton.

Spaniards brought sheep, and now Indians weave blankets, rugs and some garments of wool (pages 533-535-563).

In most villages women have showier costumes than the men. The woman wears the *huipil* (a loose blouse), a wrap around sarong like skirt, and some sort of shawl and head dress. Colors run through the spectrum from deepest reds through saffron yellow to blue and violet (page 534).

From Antigua you may begin your climb into the Highlands in earnest. Though most mountain roads in Guatemala are not paved, they have an all-weather surface, and you may go over them even in the months from May to November when daily showers scour the hillsides.

To climb the heights—one road tops a pass at nearly 11,000 feet—roads twist in hairpin turns up hills and down into innumerable ravines. Dark pines and lichen-covered oaks clothe the hillsides, and wet gray mist swirls up from the valleys. The cold upland forest gives off a smell of resin and of charcoal fires.



San Antonio Women Weave and Wear an Intricate *Huipil*

San Antonio Aguas Calientes near La Antigua is one of the few villages that use rayon and silk in weaving. Blouses vary in detail but over all geometric effect is similar. *Huipiles* are simply made of two strips like one this woman weaves sewn together. The unsewn middle of the seam becomes the head opening

that look mutely down from Godinez. The three volcanoes on the far side of the lake were invisible in the white fog. Through gaps in the mist I glimpsed the red roofs of San Antonio Palopo, nearly 2,000 feet below.

Formed originally by volcanic action, 13-mile long Atitlan is 1,500 feet deep in places. Because there is little shallow water, the lake has comparatively few kinds of fish. One, the *mojarra*, grows to the size of a man's hand. Villagers catch it on hook and line for food.

Surprisingly, small fresh water crabs abound in the lake. Near the village of San Pedro La Laguna I watched fishermen set long trot-lines, baited with bits of stale fish for crabs in the transparent waters close to shore. In the gun clear lake water boats seem suspended in air over depths that shade from yellow brown of undulant underwater plants through jade green to deepest blue (page 539).

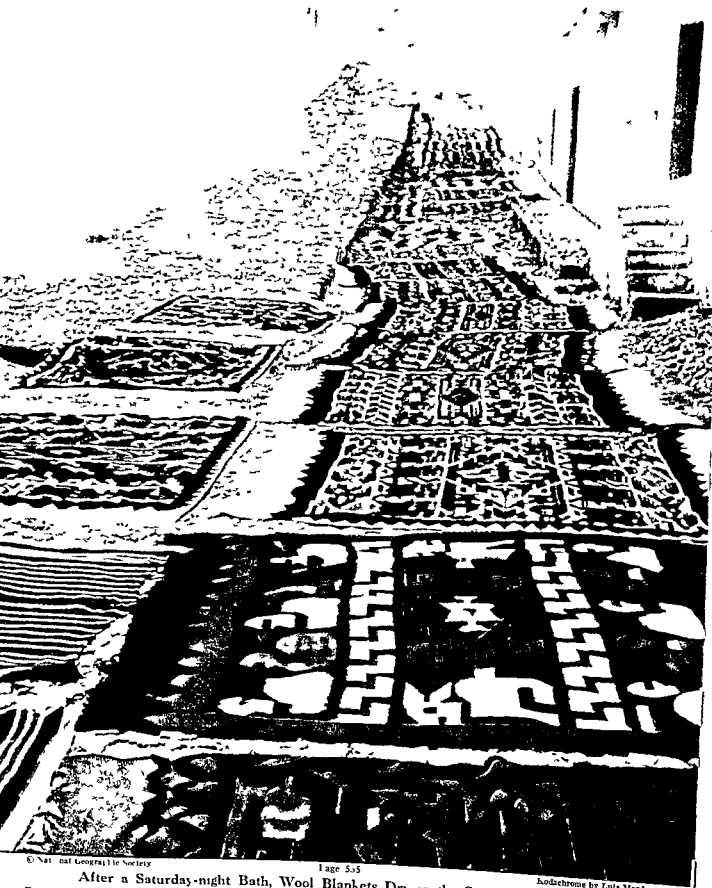
The fishermen tie the crabs' pincers with plant green rushes, then string the crabs on a long stalk. In this way the crustaceans live

for three days or more on the way to market across the lake.

With amazement I watched a *mojarra* fisherman tie a stone on his line as a *float*. My eyes bulged as it bobbed high on the water. Laughing at my surprise, the fisherman tossed me an elliptical pebble from a pile on the beach. It was as light as foam, on examining it I found it was pumice, a type of volcanic glass blown so full of air cavities by expanding gases that it floats on water.

Indians cross the lake to each others' markets or come to Panajachel, the big town on the main road to the capital, in curious dugouts of hollowed logs, which have crudely hewn planks for gunwales. Still more curious is their manner of paddling, most stand up, but natives of Santa Cruz and San Juan squat in the thwartless dugouts, and men of Santa Catarina and San Antonio paddle sitting down. Indians remain individualists to the end.

Legend says there are twelve villages on Atitlan, each named for an Apostle. Actually,



© National Geographic Society

Page 535

Kodachrome by Luis Marden

After a Saturday-night Bath, Wool Blankets Dry in the Sunday-morning Sun
Buyers from towns and the capital come to Momostenango's blanket market. The night before weavers pound the blankets in sulphurous waters of hot springs. The chemically charged waters do not dim the vegetable dyes.



© National Geographic Society

Kodachrome by Luis Marden

Cofrades of San Antonio Palopo Pose with Their Patron Saint's Ikon

These members of a religious brotherhood (page 540) appear against the backdrop of early morning Lake Atitlan. The hill behind head of the man at left is the Cerro de Oro, beyond rises San Pedro Volcano.

there are more than twelve, if you count those which are near though not on the lake. Only four bear names of the original Twelve, but it is still a good story.

One day I talked with Padre Antonio Farfan, a priest from Solola, just north of the lake who makes the round of lake villages regularly in a motor launch.

He said: "Don't let the smooth look of the lake deceive you. I have seen waves twelve feet high when opposing winds meet to form the *chocomil* wind on the lake." For this reason, natives usually cross the lake in early morning or late afternoon.

Indians' Two-way Religion

I asked about the Indians' religious beliefs. "It is true," said Padre Antonio, "that our Indians secretly pay homage to their idols burning copal incense and pouring libations of ardent water. They pray to their supreme native deity, *Nim Ajau*, God World. He is all pervading everywhere, and he brings good crops and keeps a man from evil."

But the Indians nominally are Christians, and observe Catholic feast days, don't they?

"Yes," smiled the padre. "They want to be on good terms with God, and on not too bad terms with the Devil."

"Every village has its witch doctor who preys on the superstition of his people," the padre continued. "He pretends to deliver them from the evil designs of *Ajau Juyu*, the Lord of the Forest."

Near the lake I saw caves where smoke blackened idols and wooden crosses showed that worshippers took no chances with their prayers.

Some time later I met Padre Antonio in Guatemala City and took him for his first airplane ride. At 6,000 feet I looked back to see how he was taking it. He was staring at the clouds through the cabin window, and I saw his lips form the words "Hello Peter!"

In a motor launch we visited some lake villages. At Santiago Atitlan I saw again the brilliant red wrap-around skirts and long ribbon headdresses that make up my favorite Guatemalan woman's costume. In Santiago live the Tzutuhiles, the tribe that resisted most fiercely the Spanish conquerors (pages 526, 527, 542-545).

a nasal musettelike instrument (page 541)

The climax of the dance comes when Pedro de Alvarado lances to death Tecum Uman war chief of the Quiches

In a Guatemalan Indian religious festival every thing revolves around the *cofrades* a sort of brotherhood that has care of a particular saint. For a year the image of the saint rests in the house of the chief *cofrade* (page 538)

During a festival while *cofrades* gather to perform rituals before the saint women in adjoining rooms prepare pungent hot *atol* a thin gruel of ground corn and cacao spiced with chili peppers anise and other condiments. *Cofrades* ceremoniously drink the hot *atol* from a special gourd

Marimbas for Saints

Then they carry saints images to the courtyard and dance and play marimbas for them

The marimba in its simplest form resembles the African instrument rectangular wooden keys strung in a frame hang over dried gourds acting as resonators

Don Mario Bolanos noted composer of Guatemalan music told me of the marimba's construction

The crude Indian marimbas have a range of little more than an octave they have no half tones or keys corresponding to the black keys on the piano. Big city marimbas are usually divided into two instruments that between them encompass nearly ten octaves

A marimba in the cities means the whole group of musicians seven playing the two actual marimbas plus a bass viol and drums

The official Government marimba band called *Maderas de Mi Tierra* (Woods of My Native Land) uses practically no metal in its instruments. Keys are made of *hormigo* frames of mahogany and the resonators of Spanish cedar. Players use mallets of quince wood tipped with balls of crude rubber

© National Geographic Society

Kodakome by Lu Ma den

Twin Villages near the Capital Wear Almost Identical Costumes

Principally background color distinguishes blouses of women from San Pedro Sacatepequez (left) and San Juan Sacatepequez (right). Extra *k pils* serve as shawl (page 534). Two-headed eagle of the Hapsburgs suggestive of Charles V's arms appears in the design of huipil at left

On July 25—the day of St. James—in Santiago I watched the ceremonial dance of the Conquista. In this dance wooden masked figures dance out the history of Guatemala's conquest by Pedro de Alvarado in 1524.

About 20 dancers in costumes of bright cotton and velvet dance and declaim speaking parts that run to more than 40 typewritten pages. The color of hair beard and mustachios carved into the masks distinguishes the dancers. Spaniards have yellow hair and beards Indians black.

High singsong voices issue from expressionless wooden faces as performers shake rattles and move to the music of drum and *chirimia*

in the hot coffee fields near Retalhuleu. I later saw the tall *hormigo* tree from the reddish wood of which marimba keys are cut. Indians call the tree the wood that sings.

Guatemalan marimbas particularly in the brass notes resonate with a peculiar rattling sound. The makers achieve this effect by stretching a piece of pig intestine over a hole near the bottom of each resonator. Rings of tacky black beeswax hold the membrane stretched tightly over each hole.

Marimba players in small villages have to keep an eye on the gobs of wax on the resonators, said Don Mario. Small boys like to steal the wax and chew it.

Marimbas in the big towns play everything from serious music to jazz, but village marimbas usually play only the *son*, the national dance rhythm of Guatemala.

From the lake the road climbs higher into the mountains through Solola where Indians gather on Friday in the market place that overlooks the blue lake far below (pages 529-564) and on to Santo Tomas Chichicastenango, center of the Quiche tribe and a town well known to visitors to Guatemala (pages 553-556).

Here Indians pray on the steps of their classic white church, swing censers as they slowly work their way up to the church entrance.

Ribbon Weavers and Costume Makers

West of Chichicastenango through Totonicapán, town of the ribbon weavers and Conquistada dance costume makers, past San Francisco El Alto, the great Friday market lies 7,650 feet high, Quezaltenango, second city of the Republic.

Set amid yellow wheat fields, it has the barred windows, cobblestoned streets, and other century quiet that the capital has lost.

In Quezaltenango I saw carved jadeite rings



○ Na ma Geograph Society

K da h me b Lu s Ma d n

Father and Son Furnish Music for Ceremonial Dances in Solola

Thin reedy music of the *clari* (musette) punctuated by off-beat booming of the drum makes discordant music to the foreign ear. Like happy music, the notes all sound alike at first, but with time some ears can distinguish different tunes.

and pendants from ancient ruins (the capital of the Quiches was near here) and in bookshops I examined vellum-bound volumes three centuries old.

I visited Quezaltenango in September, time of the annual fair (page 561). In a mock Indian town, representatives of a dozen outlying villages set up displays in thatched huts. While I looked at prize fruits and vegetables, a delegate from one village, asking if I was an American, handed me two enormous potato toes, saying, "Please give these to the President of your country. Tell him the Indians of Quezaltenango are well and hope he is the same."



Imitative brethren seeing what he had done immediately pressed forward and each shouting his name and village pressed on me corn, apples, squash, sweet potatoes, blocks of sulphur, bottles of mineral charged waters (the area is rich in hot springs), cabbages, carrots, cauliflowers—all for the President of the United States.

On my return to the capital I turned over the more durable items to Ambassador Kyle who wrote a letter of thanks in the name of the President to each municipality.

To the northeast on the road that some day will reach the Department of Peten Cobán almost in the geographical center of the Republic, grows premium coffee.

Many Germans owned coffee plantations in this area and Cobán Indian women noted for their cleanliness and good looks often show an admixture of blond blood. Cobán women wear a lacy white huipil (or similar ones of silk or satin) decorated with brilliant garlands of flowers or a conventional design around the neck called little boxes and snails.

I flew to Peten in a U.S. military airplane with C. W. (Buster) Smith of the Chicle Development Company.

The Department of Peten consists of a great forest covered limestone plain that stretches to the Mexican border. Averaging 400 feet above sea level this dense jungle of 12,000 square miles is the home of jaguars, monkeys, macaws, turkeys, curassows, peccaries, deer and snakes.

The Land of Mayas and Chicle

In this hot luxuriance flourished Mayas of the Old Empire. Beginning their vast building in central Peten the Mayas trekked northward through the centuries abandoning their stone cities. No one knows for certain why some think farmlands about each city became exhausted. Finally they emerged in a new burst of building and artistic splendor in the New Empire cities of Yucatan.

Today chicle tappers follow trails in the green twilight seeking the scattered sapote trees that exude the latex from which chewing gum is made.



Chicle for Chewing Gum Flows in the Peten Jungle

Chicle home by Ius Ma Den

The latex comes from apote trees which must be searched out individually. The heavy red wood was used in Maya construction but cutting is prohibited today. Chicle gatherers tap each tree once every four or five years (page 348). Looking for new trees they have discovered Maya ruins.



C. N. Smith, George A. Smith

K. S. Smith, George A. Smith

A Quirigua Stela Wears a Bird nest Beard

Ten centuries have not changed the stolidity of the B'at'ha like face on the largest stela. Tall monuments, monstrous-shaped "adam-ites" and ruined buildings mark this Maya site near the railway line between Puerto Barrios and Guatemala City.

As we flew north, the blue mountains of central Guatemala diminished and leveled into the flat green carpet of Peten. Smith pointed out clumps of higher trees that pushed above the forest level. "Sapotes and mahoganies are the tallest trees in the forest. Sometimes sapotes reach a height of 125 feet and a thickness of a yard."

"Most of the world's supply of first grade chicle comes from Peten and southern Mexico," Buster continued. "And about a third of it comes from right here," pointing straight down.

During the war many *chicleros* took to rubber cutting and labor was scarce.

A sheet of water, Lake Peten Itza, appeared on the horizon. As we approached we could see Flores, the town on an island in the lake, with houses so crowded they seemed about to spill off into the water.

Beyond this ancient capital of the Itzas, the ruins of Tikal thrust their bony fingers into the air. Verdure-covered mounds swell up from the jungle floor, and above them white limestone towers rise to a total of more than 200 feet above the ground.

In all, about 25 ruined cities and towns have been named and partly explored in Peten. How many more there are no one knows.

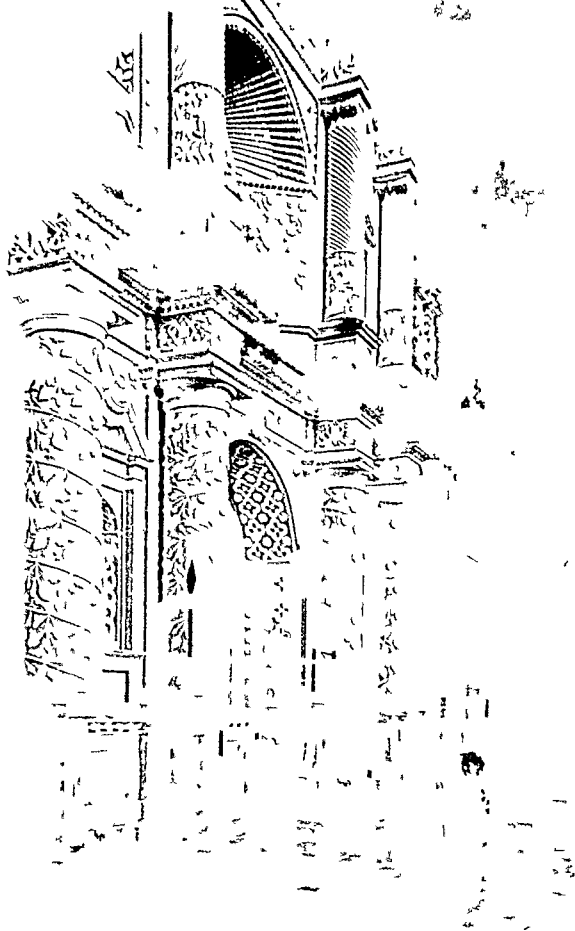
Years before, I had flown low over the jungle, looking for ruins. From the air it was easy to make out the outlines of ancient streets and plazas, appearing as fainter lines against the dense green of the vegetation.

The Birth of Chewing Gum

Landing at Carmelita, north of Lake Peten Itza, we struck off into the jungle, following a spongy wet trail between the hana hung boles of giant trees. Close to a clear little stream we watched a tapper at work on the trunk of a tall sapote (*Ichros zapota*).

The *chiclero* reminded me of rubber cutters I had seen in the forests of

* See in the NATIONAL GEOGRAPHIC MAGAZINE "Foremost Intellectual Achievement of Ancient America" February 1933. "Unearthing America's Ancient History." July 1931. "Yucatan: Home of the Gilded Maya" November 1916. "Chicken Itza and Ancient American Mice" January 1935 and "Excavations at Quirigua, Guatemala" March 1913 and "S. G. Meley and 'Exploring Ancient America's Finest Sculptures' by J. Allen Mason November 1935.



Photograph by
 Page 49
 With a Façade Like Cake Icing La Merced Remains Best preserved of Antigua's Churches
 Kodak photo by Lu a Ma d

Nicaragua with his stiffened trousers and cap thick with the drippings of countless chicle bleedings.

First he lifted a splinter of bark near the base of the tree under this he inserted a canvas bag. From the bag he hacked with his machete a series of cuts up to the first branches high overhead (page 547).

Unlike rubber trees which may be tapped regularly, said Buster, sapotes should be tapped only every four or five years. That's why cutters have to wander far afield from a base camp to look for more trees, since sapotes never grow in a solid stand. A cutter can tap six to eight trees a day.

But Buster smiled. He won't run out of material, as there are about 30 million trees in Peten. Approximately three quarters of these have already been tapped at one time or another.

Dense red sapote wood was used by the old Mayas in building. In Yucatan I have seen sapote lintels a thousand years old still soundly supporting their burdens of stone. But today the Guatemalan Government fines anyone who cuts down a sapote tree \$50. They are worth much more standing.

Chicleros boil chicle in big three legged iron pots—the kind cannibals in cartoons boil missionaries in—then pour the hot liquid into molds. Hardened blocks go by air to Guatemala City or to Puerto Barrios. Guatemala's export of chicle has been worth from two to three million dollars annually in recent years.

If you fly from Peten down to Puerto Barrios on the Caribbean you may pass over an other lowland lake, Izabal, close to the port of Livingston.

Travelers making the circuit from Coban to the coast go by auto road through places with names like bird sounds in the night. Tamahu and Tucuru then by road and rail to Panzos on the Polochic River. From here a launch will take you to Lake Izabal.

A Hunt for Manatees

I was curious to see if manatees (*Trichechus manatus*) still existed in the lake. An American colonel in Guatemala City had told me how years before he had seen sea cows sitting in the shallows of the lake and munching weeds like hillbillies gnawing turnips.

Manatees are big herbivorous mammals with a snout flattened at the end and a round spatulate tail.

Supposedly the sea cow gave rise to the mermaid legend in the days of sailing ships. One may wonder how anything so ugly (page 546) could pass for a woman. After a sailing

voyage lasting many months, an old time sailor might not have been too critical particularly of animals whose females sit upright and nurse their calves by holding them against their breast with one flipper, in a curiously human fashion.

At El Estor on the northern shore of the lake I asked for a manatee hunter. A little man stepped forward. My name is Tranquilino Garcia, he said. The name seems to go with hunters of water animals. In El Salvador another Tranquilino had shown me how to capture four eyed fish.*

I am the last of the manatee hunters, said Tranquilino. In my youth I used to go out with my grandfather, father, and brothers but now I am alone.

Tranquilino puffed on a bulldog pipe. Waving an arm he said. The beasts live across the lake. They feed on grass on the lake bottom but have to come up regularly for air. I'll go ahead in one canoe, you follow with the cameras in another.

Across the lake we disembarked at a village that looked like something in the South Seas. Before straw huts on the beach sat women from 12 to 60 cracking nuts of the cocon palm (*Acrocomia*) from the kernel of which oil would be extracted.

The women wore only a blue wrap-around skirt and a necklace of red beads. With brown breasts rising and falling to the rhythm of the pounding they nodded their heads and told us. Plenty manatee in the bay.

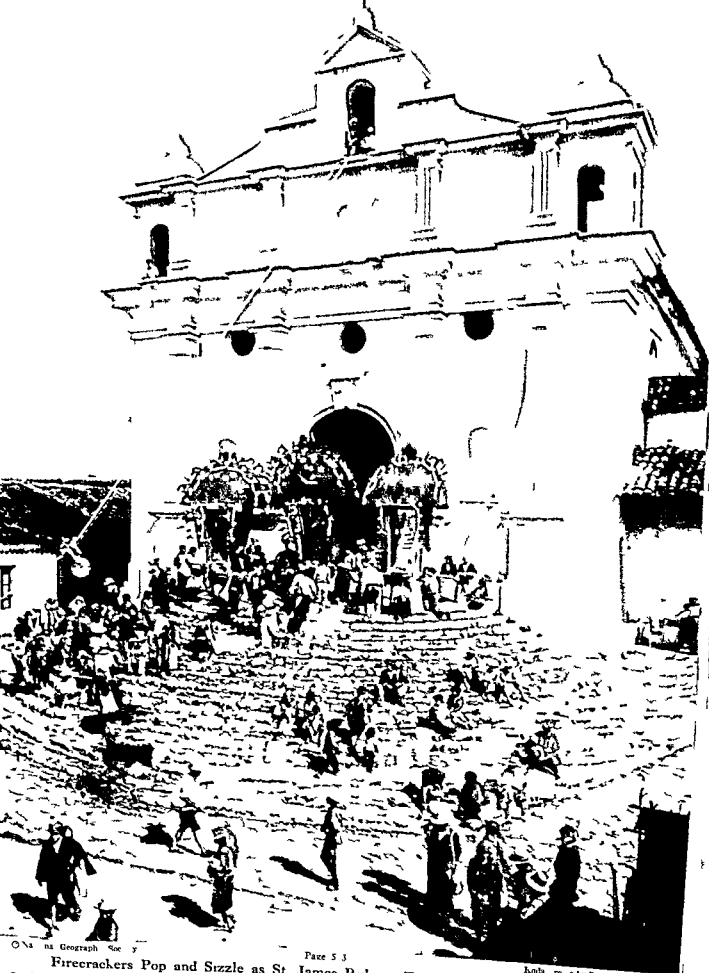
Taking his seat in a dugout canoe barely big enough for one man, Tranquilino wrapped his arm about a paddle, clamped his pipe between his teeth and glided out over the smooth water. We followed in a larger dugout.

Harpooning a Sea Cow

Paddling silently over the 15 foot deep glassy water Tranquilino suddenly held up his hand. Ten yards ahead the shiny skin of the surface broke to the roll of a glistening gray brown back, then a flat round tail tipped up and disappeared. Across the water came a sighing ah chuff of exhaled breath.

Silently (the slightest sound frightens a sea cow) Tranquilino changed direction. He seemed to know where the animal would surface next. When it breached again this time close to the boat Tranquilino was ready. Without relinquishing his grip on the pipe he lifted and hurled the harpoon with one movement. It struck home and the sea cow sounded with a resounding whack of its broad tail.

* See Coffee Is King in El Salvador by Lu S. Marden NATIONAL GEOGRAPHIC MAGAZINE November 1944



On the Geographic Society

Page 53

Photo by Lu & Ma J n

Firecrackers Pop and Sizzle as St James Rides a Tightrope on All Saints Day

On feast days celebrants haul the horseman up and down from the belfry of Santo Tomas Chichicastenango. The effigy wears a necklace of 300 year old pieces of eight firecrackers explode in a basket under the horse



Page 157

Antonio Proudly Directs Religious Rites Homeward bound Women Walk in Indian File —San Juan Sacatepequez
 Babes ride on mother's back market purchases full baskets Rarely do Guatemalan Indians walk abreast Perhaps the habit comes from climbing mountain trails

On a G. P. S. Y.

cow with a club. For nine hours they were towed up and down the bay, under a grueling sun, until finally they dispatched the animal close to the shore, and beached it with the help of enthusiastic villagers.

Fresh meat is scarce on Lake Izabal, and the manatee would furnish "three kinds of meat," said Tranquilino, "some like beef, some like veal, and some like turtle meat."

Rafts of Red Mahogany

We did not stay to taste roast manatee, but took with us some of the thick hide.

Sailing down the length of Lake Izabal, we descended the Rio Dulce, whose banks, luxuriantly covered with thick forest growth, seem nearly to meet overhead in places. We passed rafts of red mahogany logs floating down to Livingston on the Caribbean.

At Livingston we saw whips and riding crops made of translucent amber manatee rawhide. The flexible crops are so brutal a weapon that police regulations forbid their carrying in Guatemala City.

Livingston people assured me solemnly that anyone struck with a manatee crop, however lightly, will shrivel up and die. Just touch someone with it in anger, and soon he is a husk, just like a mummy.

We saw many Caribs in Livingston. Though black, they are not Negroes, having a different cast of features and straight hair. They speak and write a special jargon of English similar to that of British Honduras and West Indies Negroes who live along the coast.

Just before I left Guatemala I went up to Momostenango, high in the Altos, 65 miles northwest of the capital. Nearly 7,300 feet above sea level, Momostenango glistens in its high perch. The clear air burns in the nostrils like menthol.

This is Guatemala's linket center. Every Sunday buyers from the neighboring towns

Long-tailed, Red-breasted Quetzals Symbolize Liberty and the Republic

A Coban woman holds mounted specimens of the national bird of Guatemala. Selected as the country's emblem because it usually languishes in captivity, the quetzal (*Pharomacrus mocino*) appears on the national coat of arms, coins, and stamps. Design for one Guatemalan postage stamp was taken from a color plate in the October 1936 NATIONAL GEOGRAPHIC.

The shaft came away from the barbed harpoon and bobbed to the surface. The bobbin with its yards of line lay spinning rapidly in a wreath of bubbles.

Tranquilino picked up the bobbin made fast the line and blew a triumphant blast on a conch shell. The bellow, as of a wounded bull, brought his companion in a big canoe.

A second harpoon was thrown into the animal, the hunter transferred to the large canoe and the manatee towed the dugout at a fast pace over the smooth waters of the bay.

Laboriously bringing in the line a foot at a time, the hunters struck repeatedly at the sea

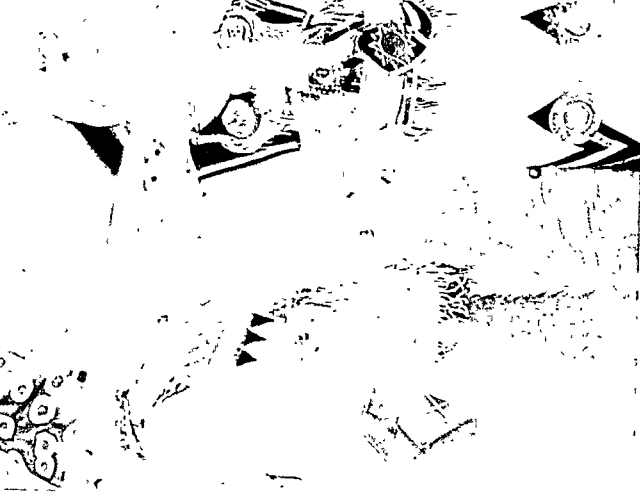


Slanting Rays of the Setting Sun Gild Guatemala City's Cathedral in Central Park
 The guard stands at the entrance to the imposing new National Palace built in 1941 (page 530) Fountains in its
 patios fall into blue and yellow tiled basins Bronze quetzals surmount chandeliers in the state reception room



National Geographic Soc. ety

Drums, Musettes Make Devil's Din at Quezaltenango Fair



Market Vendors Tuck Their Feet Under for a Comfortable Seat

Monuments show Maya ancestors of these women of San Antonio Aguas Calientes squatting in exactly the same position. In the market place of La Antigua, the old capital, they sell cabbages and other giant vegetables grown in the rich volcanic soil of the region. Hot springs gave their town its name.

and from the capital climb the road to Momostenango's open air blanket market to finger and purchase. Blankets of every color and design lie in the sun to dry. (pages 535-563)

When I asked if vegetable dyes were still used, I was told, 'Yes, particularly since the Indians were unable to get aniline dyes during the war.'

I was shown pieces of orange, dark brown, and yellow wool, which, boiled with the wool, impart color.

'We get a purple dye from Brazilwood,' said my informant. "*Palo amarillo*—yellow wood gives a yellow color from campeche wood we get a blue or black. The best blue, of course, comes from the indigo plant."

'How do you get the other shades?' I asked.

Well, now it gets complicated. For green we mix chips of campeche and yellowwood; red is either good aniline dye, or, in the case of very high priced blankets, cochineal.

On Saturday night weavers take their blankets to the river, deep in a ravine below the town and pound and wash them in the warm sulphurous waters. If the colors stand the hot chemically charged water, they will stand anything.

Men, women and children strip to the buff to beat the blankets; then, work finished, they

bathe in bubbling pools. Huddled close together, their glistening bodies flickeringly lighted in orange and yellow by smoking torches, the Indians form part of a scene like a Dore illustration for Dante's *Inferno*.

When I made pictures of blankets drying in the sun until long past lunch on Sunday, my Indian interpreter reminded me, "*Patrón*, the stomach is asking for tortillas."

The Lord of the Burning Place

High on a hill above the town rise mounds of broken potsherds. These are the *quemaderos*, the burning places of Momostenango, the altars of God World. Here worshippers light candles and pray on holy days of the *tzolkin*, the 260 day Maya calendar.

Though heads of families may make their own invocations, they usually employ a *chuch cajau* or Lord of the Burning Place, who for cigarettes, bread, chocolate, or 25 cents, will intercede with the deity on their behalf.

Most important day of the year in the Momostenango region is Guayaquip Bats—the day of Eight Thread, sometimes translated Eight Monkey. It comes around once every eight months and fifteen days of our calendar, at which time some 15,000 Indians come down from the hills to pray at the burning places.

Black Hats and Somber Clothes Denote Chief Men on Corpus Christi Day

Ordinary citizens wear costume at left. Checked wrap around knee length skirts over wide trousers add a curiously feminine note. Heavy wool jackets at center display stylized bat symbols. To keep vampire bats from lapping blood of cattle Sololá villagers hang spined prickly pear pads in stalls. Despite their voice 'radar' bats occasionally impale themselves in the dark.

I was there on another holy day, the day of One Corn. As we climbed the hill to the altars, the ground glittered as if strewn with diamonds; tiny quartz crystals caught the light like miniature mirrors.

At the top my companion grasped my arm and whispered, "We are in luck," pointing to an old man with a patriarchal beard and a high conical straw hat. "That's the chief medicine man." Raising his voice, he asked, "May we join you, Señor Poronel?"

The old man courteously lifted his pointed hat and nodded. We walked after him between the mounds of smoke blackened pottery fragments to the biggest altar, called Big Broom. Little hollows in the jagged piles held stubs of yellow candles, dead marigolds, and ashes of incense.

The old man climbed to the topmost burning place of the mound, while his wife and son waited below. Unwrapping the corn husks from a package of copal wafers, he lighted a disk of the resin and began to pray.

As the blue smoke spiraled upward, I became aware of a droning and muttering around

me. Through the clouds of incense smoke I could see figures of men and women kneeling before flickering fires.

The medicine man prayed in his sibilant, staccato tongue, occasionally lapsing into Spanish. The smoke grew thicker.

Opening a little knitted bag, the old man strewed bright red beans and shining quartz crystals on the black ashes. He muttered and waved a hand in our direction.

When he had finished I asked, "Señor Poronel, what were you praying for?"

"Señor," answered the old man, "I asked God World to grant you and your friends a safe journey back to the capital and to your faraway country. But," he added, his kind brown face creasing into a thousand fine wrinkles as he smiled, "you will return. I have seen it in the crystals."

I said, in the Spanish phrase, "May God hear you!"*

* See also in the NATIONAL GEOGRAPHIC MAGAZINE: To Market in Guatemala by Luis Marín, July, 1915; Guatemala Interlude by F. John Long, October, 1936; and Guatemala: Land of Volcanoes and Progress by Thomas F. Lee, November, 1926.

VOLUME LXXI

NUMBER SIX

THE NATIONAL GEOGRAPHIC MAGAZINE

JUNE, 1937

A Modern Pilgrim's Map of the British Isles

C. E. RIDDIFORD

Washington, Home City and Show Place

With 11 Illustrations

LEO A. BORAH

Washington Builds for the Future

20 Natural Color Photographs

Hunting the Voices of Vanishing Birds

With 32 Illustrations

ARTHUR A. ALLEN

In the Empire of the Aztecs

With 14 Illustrations

FRANK H. H. ROBERTS, JR.

Aztecs Under the War God's Reign

10 Paintings

H. M. HERGET

Where Bretons Wrest a Living from the Sea

23 Illustrations

F. W. GORO

Men Against the Rivers

With 22 Illustrations and 2 Maps

FREDERICK SIMPICH

The Society's New Map of the British Isles

With 3 Illustrations

ANDREW H. BROWN

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
WASHINGTON, D.C.

\$3.50 A YEAR

50c THE COPY

NATIONAL GEOGRAPHIC SOCIETY

GEOGRAPHIC ADMINISTRATION BUILDINGS

SIXTEENTH AND M STREETS NORTHWEST, WASHINGTON, D. C.

GILBERT GROSVENOR, President
ROBERT V FLEMING, Treasurer
HERBERT A POOLE, Assistant Treasurer
LYMAN J BRIGGS, Chairman ALF

JOHN OLIVER LA GORCE, Vice President
GEORGE W. HUTCHINSON, Secretary
THOMAS W. McKEW, Assistant Secretary
Vice Chairman, Committee on Research

EXECUTIVE STAFF OF THE NATIONAL GEOGRAPHIC MAGAZINE

GILBERT GROSVENOR, EDITOR

JOHN OLIVER LA GORCE, Associate Editor

J R HILDEBRAND
Assistant Editor
MELVILLE BELL GROSVENOR
Assistant Editor
McFALL KERBEY
Chief of School Service
LEO A BORAH
Editorial Staff

FREDERICK SIMPICH
Assistant Editor

ALBERT H. BUMSTEAD
Chief Cartographer

E. JOHN LONG
Editorial Staff

FRANKLIN L. FISHER
Chief Illustrations Division
MAYNARD OWEN WILLIAMS
Chief Foreign Editorial Staff
CHARLES MARTIN
Chief Photographic Laboratory
LEONARD C ROY
Editorial Staff

BOARD OF TRUSTEES

ROBERT V. FLEMING
President and Chairman of the
Board, Riggs National Bank

WALTER S. GIFFORD
President American Telephone and
Telegraph Co.

DAVID FAIRCHILD
Special Agricultural Explorer U. S.
Department of Agriculture

C HART MERRIAM
Member National Academy of
Sciences

LYMAN J. BRIGGS
Director National Bureau of
Standards

GEORGE R PUTNAM
Commissioner of Lighthouses
Retired

THEODORE W NOYES
Editor of The Evening Star

GEORGE W. HUTCHISON
Secretary National Geographic
Society

CHARLES EVANS HUGHES
Chief Justice of the United States

WILLIAM V PRATT
Rear Admiral U S Navy, Retired

RAYMOND S PATTON
Rear Admiral Director, U S Coast
and Geodetic Survey

ALEXANDER WETMORE
Assistant Secretary, Smithsonian
Institution

GILBERT GROSVENOR
Editor of National Geographic
Magazine

J HOWARD GORE
Prof Emeritus Mathematics The
George Washington University

ELISHA HANSON
Lawyer and Naturalist

JOHN J. PERSHING
General of the Armies of the
United States

GEORGE OTIS SMITH
Formerly Director U S Geological
Survey

O H TITTMANN
Formerly Superintendent U. S.
Coast and Geodetic Survey

JOHN OLIVER LA GORCE
Associate Editor of the National
Geographic Magazine

CHARLES G. DAWES
Formerly Vice-President of the
United States

GEORGE SHIRAS 3d
Formerly Member U S Con-
gress Faunal Naturalist and
Wild Game Photographer

OSCAR WESTOVER
Major General, Chief U S Army
Air Corps

CHARLES F. KETTERING
President General Motors Research
Corporation

ORGANIZED FOR 'THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE'

To carry out the purposes for which it was founded forty nine years ago the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material which The Magazine can use generous remuneration is made. Contributions should be accompanied by addressed return envelope and postage.

Immediately after the terrific eruption of the world's largest crater, Mt. Katmai in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—The Valley of Ten Thousand Smokes, a vast area of steam-spouting craters. And in the foot of Ten Thousand Smokes, an area has been created a National Monument by proclamation of the President of the United States.

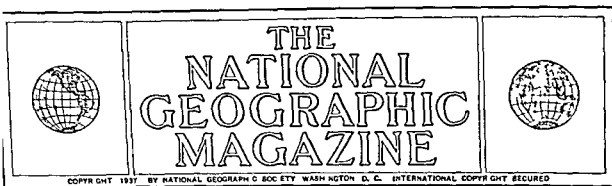
The Society cooperated with Dr William Beebe in a deep-sea exploration of underseas life off Bermuda during which a world record depth of 3 038 feet was attained August 15 1934 enabling observations of hitherto unknown submarine creatures.

The Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary who discovered the North Pole and contributed \$100,000 to Admiral Byrd's Antarctic Expeditions.

The Society granted \$25 000 and in addition \$75 000 was given by individual members to the Government when the congressional appropriation for the purpose was insufficient and the finest of the giant sequoia trees in the Grant Forest of Sequoia National Park of California were thereby saved for the American people.

The Society's notable expeditions to New Mexico have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region the Society's researchers have solved secrets that have puzzled historians for three hundred years. The Society is sponsoring an ornithological survey of Venezuela.

On November 11 1935 in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps the world's largest balloon *Explorer II* ascended to an officially recognized altitude record of 72 935 feet. Capt Albert W. Stevens and Capt Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments and obtained results of extraordinary value.



WASHINGTON, HOME CITY AND SHOW PLACE To Residents and Visitors the Nation's Capital Presents Varied Sides as the City Steadily Grows in Beauty and Stature

By LEO A. BORAH

AUTHOR OF *UTAH CARVED BY WINDS AND WATERS* A PATRIOTIC PILGRIMAGE TO EASTERN NATIONAL PARKS
WASHINGTON THE EVERGREEN STATE ETC IN THE NATIONAL GEOGRAPHIC MAGAZINE

TO MANY persons Washington is many things

One friend of mine, a young printer, came here for a three day visit and devoted the entire time to a study of the graphic arts display in the Smithsonian Institution, which covers the history of printing from the time of Gutenberg to the present

Another had little interest in anything but the debates in Congress

A third could not be lured away from the extraordinarily far reaching and complete philatelic exhibit in the new Post Office Department

Whatever the visitor's particular curiosity may be, the Nation's Capital seems to offer something to satisfy it

Residents of Washington are amazed by the variety of sights their visitors wish to see. More news and photographs originate here than in any other city and pilgrims to the capital usually have their own ideas of where they would like to be taken. Showing the home folks the infinite variety of sights, scenes and dignitaries is a major form of entertaining out of town guests

Long propinquity has made Washington residents accustomed to the presence of the famous and near famous. If a man prominent in public affairs grows weary of the adulation of hero-worshippers, he has only

to retreat to Washington to enjoy virtual anonymity

A rather shy appearing elderly gentleman used to walk past the headquarters of the National Geographic Society four times each day on his way to and from work. Among other pedestrians he passed unnoticed, though in most cities he would have attracted a queue. He was Andrew Mellon, then Secretary of the Treasury, the man who recently presented to the United States one of the finest collections of paintings and other works of art ever assembled, and added to the gift a \$10,000,000 gallery in which to display them! (Page 686)

UNCLE SAM ANSWERS A MILLION QUESTIONS

People everywhere are familiar with the Government departments through the extension services that reach all parts of the country. For information on almost any topic within reason, one has only to call the proper office

Thousands of students come here not only because of excellent universities and colleges but also because Government agencies and private institutions afford unparalleled opportunity for research. If it is necessary to ascertain the names, nature or classification of rare species of flowers,

for example they carry the question to the Department of Agriculture or to the United States National Herbarium where an expert quickly supplies authoritative data.

If a question arises concerning trade practices in a foreign land accurate information is available in the Department of Commerce. For human interest material and statistics on other countries there are the embassies and legations of those nations. The Library of Congress and the archives of the United States furnish a wealth of material on history. The National Bureau of Standards is a mine of scientific information. There is not a Government department that does not stand ready to help the serious inquirer. In this respect Washington is actually a great public research university.

My 11 year old son, interested in collecting moths and butterflies, has been of late a frequent caller at the entomological laboratories in the National Museum. He comes home full of casual remarks about scientific classifications that are Greek to me.

It is not particularly comforting to me to know that on Plummer Island alone a short distance up the Potomac some 2,000 kinds of beetles have been found, but I do enjoy the flash of fireflies in the dusk of summer evenings and the bright colors of the more than 100 varieties of butterflies that flit about flower gardens.

WASHINGTON STILL HAS FRONTIERS

Almost everyone is amazed to discover how much really unspoiled natural country remains in the Nation's Capital. Near my home is a tract of perhaps a hundred acres of woodland and meadow where wild blackberries and strawberries grow where coveys of quail scuttle to cover at anybody's approach where youngsters of the neighborhood build concealed huts and defend them against all rivals.

The District of Columbia welcomes more than 300 species of birds each year, perhaps 150 of them casual or rare visitors but many of them year round residents. Since the passage of a protective law in 1932 the District has been a veritable wild bird haven.

The bald eagle, the turkey vulture, the wood duck, the pheasant, the black crowned night heron, the quail, the starling, several kinds of owls and hawks, and about 25 other birds are permanent residents.

Within the city it is not unusual to hear the song of a wood thrush or sight the bright flame of a cardinal.

Theodore Roosevelt listed more than 90 kinds of birds seen in the White House grounds or near by, and 17 of them nested there. Wrens, chickadees, finches, orioles, swallows, and sparrows are perhaps the most numerous, but bluebirds, cedar waxwings, juncos, golden crowned kinglets, and even cuckoos are not uncommon.

A nighthawk recently passed a day on a limb near my office window in the NATIONAL GEOGRAPHIC headquarters building. Unfortunately a multitude of starlings have become a nuisance in recent years driving away from favorite haunts many of the most popular native birds.

SOME FOUR FOOTED RESIDENTS

There are five kinds of wild squirrels here, the gray fox squirrel and the red most numerous, also cottontail rabbits, woodchucks, muskrats and chipmunks. Beavers and pine martens which used to inhabit forested districts are virtually gone but occasionally a red or gray fox, a raccoon or an opossum may be seen in woodland areas.

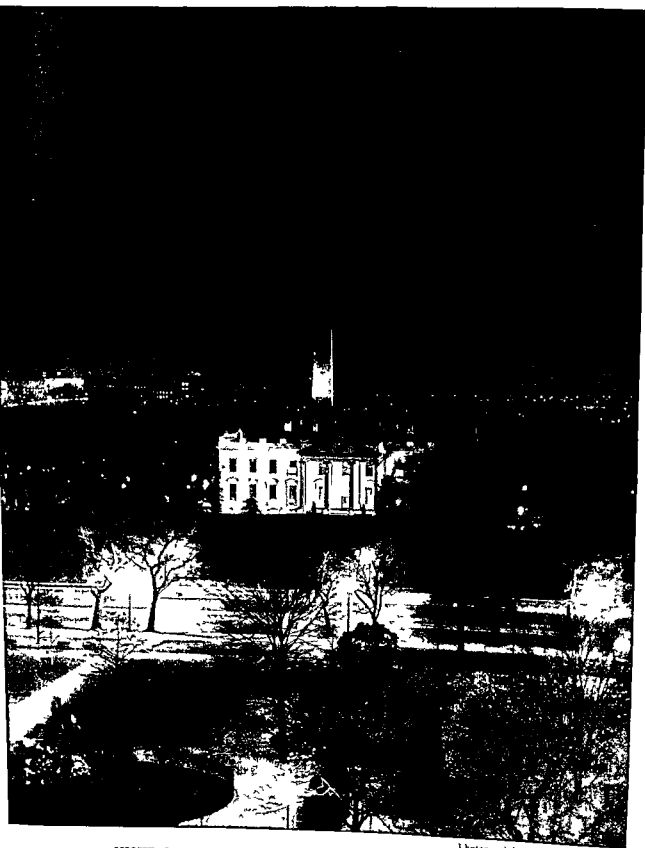
Of snakes the District has 23 kinds, only one, the copperhead, poisonous. It is a comparatively short time, however, since rattlers lurked in some of the wild blackberry patches. Children make pets of tortoises of several sorts which they find in the woods and parks.

Rock Creek Park is a constant source of delight with its more than 1,800 acres of natural woodland and its pretty stream breaking into foam over scattered boulders. Here children go fishing for small fry for all the world as I used to do in the brook near my home in a small midwestern town.

I stood one afternoon on a rustic bridge that spans the creek and watched a half dozen boys pole a Tom Sawyer raft along the shallow stream where legend reports Robert Fulton once tested a model of his *Clermont*, the boat that revolutionized navigation.

There are more than 30 miles of bridle paths in the park, and hiking trails climb cliffs and hills steep enough to give the enthusiast a taste of mountaineering. When motoring through this recreation area one has choice of many winding roads totaling more than 25 miles.

In one of the most restful spots in the park, old Pierce Mill has been restored.



NIGHT SOFTENS THE OUTLINES OF THE WASHINGTON SCENE

1 photograph by J. Baylor Roberts

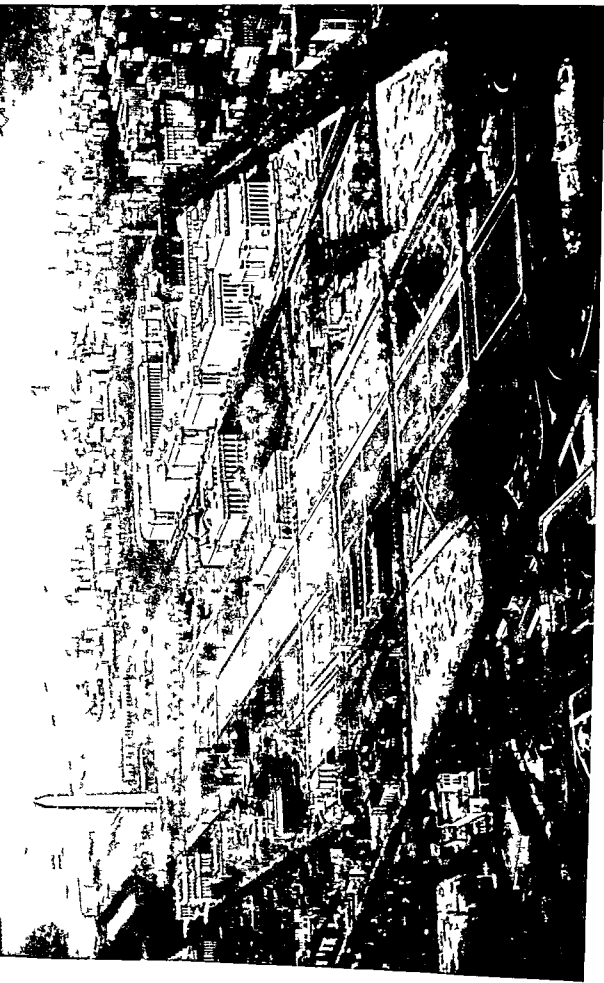
Expressive of the hospitality of the old South is the White House glowing warmly in its setting of darkness and distant lights. The Washington Monument beyond seems a sentinel at attention. At the lower left Old Hickory—Andrew Jackson—doffs his campaign hat at the grandeur of the city he once called "a mudhole on the Potomac." This view across Lafayette Park shows the north portico of the Executive Mansion and the part of Pennsylvania Avenue where Presidents review inaugural parades.



Photo by J. Bayliss

UNMINDFUL OF A DOWNPOUR, WEST POINT CADETS MARCHED IN THE INAUGURAL PARADE, JANUARY 20, 1937

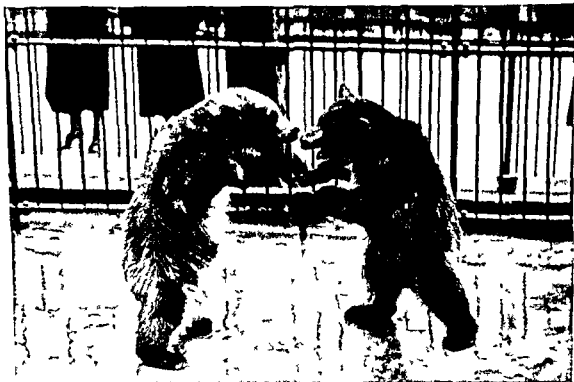
Anticipating heavy weather they brought along extra uniforms to don after the procession. Not so fortunate were the Midshipmen from the Naval Academy at Annapolis. They had to enjoy evening leave as best they could in wet garments. In ironic contrast to this first January Inauguration the abandoned March 4 the same year turned out to be a perfect day!



Photograph by B. Ansony, was taken from Goodyear A-501 R / on e

FINLET OF MAGNIFICENT DISTANCES IN WASHINGTON IS THE MALL

From Capitol to Lincoln Memorial and Arlington Memorial Bridge stretches a green expanse of park about two miles long. The Apex Building of the Federal Triangle, the huge edge of masonry at the right between Constitution and Pennsylvania Avenues, is now under construction (page 679). The Mellon collection of priceless works of art presented to the Nation will be housed in a magnificent new building to be erected on the spacious site just to the left of the Triangle's apex on the same side of Constitution Avenue as the National Museum (with the dome). Low temporary wooden buildings near by on both sides of the Mall will be eliminated.



A photograph by J. Baylor Roberts

THEIR FATHER IS A POLAR BEAR, THEIR MOTHER A KODIAK

So far as is known the three hybrid cubs in the National Zoological Park are the only specimens of their kind ever born in captivity. Two of the healthy mischievous little chaps here pose for a boxing match. The trio are great favorites with Washington children who have named them Taku, Pokodiak and Fridgee.

exactly as it was in the half century before 1897 when it closed down because a shaft was broken. A white haired miller proudly superintends the grinding of corn and wheat and the visitor may purchase water ground cornmeal, or graham whole wheat, or white flour. The surplus is sold to the cafeterias in Government buildings.

ROCK CREEK TURNS AN OLD MILL WHEEL

A little millrace diverted from Rock Creek rushes around a dam at the mill turning an 'undershot' wheel which operates by means of wooden cogwheels the time-worn buhrstones that grind the grain. Pierce Mill is the only survivor of eight operated by the stream in early days.

I had heard stories from my parents and grandparents about flour and meal they obtained by taking their grain to the mill and waiting while it was ground. Though I had no corn or wheat of my own to entrust to the miller I watched him run some through the machinery and when he had finished it I bought a bag each of graham and corn meal. The batter bread made from that

meal and the hot rolls from the graham convinced me that my pioneer ancestors did not suffer for want of good things to eat.

The National Zoological Park has been greatly enlarged and developed since 1925 by Dr. William M. Mann who now is in Sumatra at the head of the National Geographic Society Smithsonian Institution East Indies Expedition obtaining new specimens. It ranks as one of the most extensive and interesting in the world.

Among the major attractions is the section devoted to bears and in one of the cages fighting and frolicking are three of the most remarkable cubs that ever boxed each other's ears. Hybrids they are believed to be the only ones of their kind yet born in captivity. The father is a polar bear their mother a Kodiak brown bear.

In the up-to-date birdhouse and the flight cages near it live Andean condors and flightless cormorants from the Galapagos besides hundreds of more familiar species. About 100 wild black crowned night herons have made their permanent home near the largest flight cage apparently to keep their captive relatives company.



Photograph by Harrison Howe, Walter

A WARLIKE ADORNMENT OF THE OLD STATE DEPARTMENT BUILDING POINTS AT THE WHITE HOUSE

The only menace however is in appearance the cannons fighting days are long since over. A brass 6 calibre smoothbore it was made in Seville in 1777 and captured at Manila Bay. The anchor by comparison is new, dating only from 1883. The relics recall that this was long the State War and Navy Building. The State and War Departments still have their headquarters here. Across the street uniformed police men stand at the west steps of the White House leading to the Executive Mansion and offices (right).

Separated from the public by glass screens in the reptile house—the last word in comfortable quarters for serpents—are cobras (six varieties), rattlesnakes, water moccasins, African puff adders, coral snakes, and other poisonous kinds. Boa constrictors, pythons, and anacondas live in compartments which resemble their habitats.

Several years ago when Dr. Mann and his colleagues were trying to obtain funds from Congress to develop the National Zoological Park, one of the keepers in the birdhouse trained a handsome myna bird from India to say, "How about the appropriation?" The bird was an apt pupil, and when the Congressional Committee arrived, it spoke its piece.

Someone laughingly replied, "So's your old man!" Since that time it has been possible to induce the bird to repeat the conversation. "How about the appropriation? So's your old man!" The efficacy of the myna's effort to obtain help for the zoo is attested in many handsome new buildings.

So far as possible the zoo displays other specimens in their natural surroundings. Flight cages contain miniature mountains and craggy heights. Tropical animals are housed in realistic jungle scenes. It would take several days of wandering about the 175 acres of the park merely to see all the interesting creatures it contains.

MANY VISIT THE SOCIETY

Every year, thousands of the more than a million members of the National Geographic Society are shown through The Society's headquarters on 16th Street. They and a multitude of others come to see such varied exhibits as these:

A scale model of the gondola and the instruments used by Captains (now Majors) A. W. Stevens and Orvil A. Anderson in the stratosphere expedition conducted by The Society and the United States Army Air Corps in 1935.

Some of the bathysphere equipment with which William Beebe explored ocean depths a half mile down.

The flags flown by Admiral Byrd at both the North and South Poles.

The chronometer Sir Ernest Shackleton carried on his expedition of 1908-09.

Temple banners and the robes, saddle and trappings of a Muli king brought from Chinese fastnesses by Joseph Rock.

A necklace of 2,500 hand-drilled turquoise beads unearthed at Pueblo Bonito,

New Mexico, by Neil M. Judd, and believed to be at least 1,000 years old.

Explorers' Hall, where outstanding pictures made by The Society's photographers in widely separated parts of the earth are on display.

Many are eager to learn about the processes employed in The Society's well equipped laboratories which make possible the remarkable natural color photographs used to illustrate The Magazine.

THE WHOLE CITY LOVES TO PLAY

Washington loves outdoor sports, and the city provides full opportunity for their enjoyment. In the public parks alone there are 89 tennis courts, 32 baseball diamonds, 10 golf courses, 35 horseshoe courts, 26 picnic groves, 23 playgrounds.

Among the recreational highlights are polo, the equestrian drills at Fort Myer, and the Army, Navy, and Marine band concerts held in Washington parks in summer.

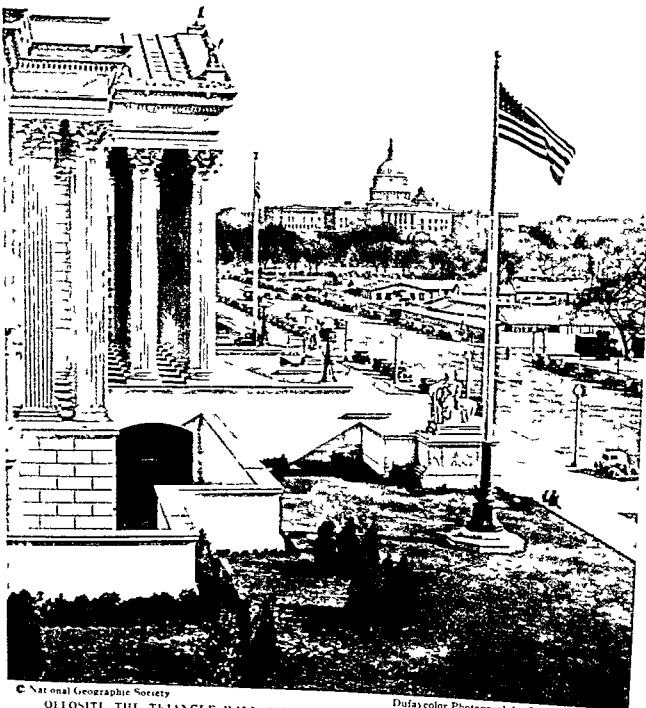
A few weeks ago the National Botanic Garden displayed 1,700 azalea plants in full bloom. This show was followed by one of rhododendrons, together with Easter lilies, hyacinths, and other flowers. Under the direction of the Congressional Library and the office of the Architect of the Capitol, the Botanic Garden has gained recognition as among the finest in the world.

In one part of the new million dollar building the visitor finds himself literally transported to the Tropics. Exotic plants from mysterious jungles thrive amazingly under scientific care. Here are the finest artificially grown specimens of the long stemmed Peruvian plant from the fibers of which Panama hats are made, and dozens of rare anthuriums with leaflike flowers so weird as to seem figments of a dream.

Another room contains a bewildering collection of cacti, ranging in shape from the spherical bishnaga to the wandlike ocotillo, and in size from tiny spikes half an inch tall to 20-foot giants from the Southwest.

To the newcomer by train Washington is a delight, particularly if he has come from a crowded city of skyscrapers and industry. He steps out of the Union Station to look across a charming plaza to the Capitol. An elaborate fountain plays above a large reflecting pool, and he little suspects that beneath it lie a vehicular tunnel and a subterranean garage for 270 congressional automobiles (Color Plate VI).

Here is real spaciousness, room to

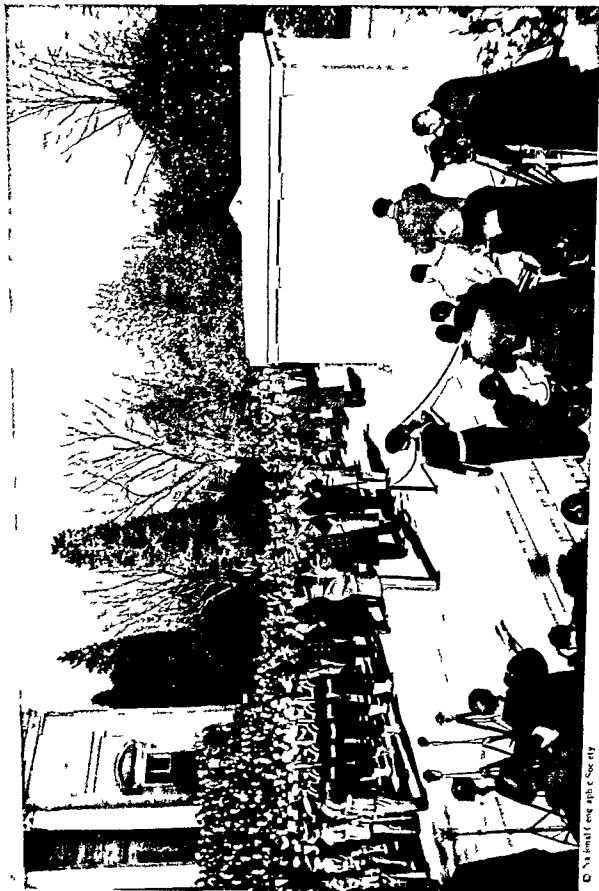


© National Geographic Society

Dufay color Photograph by J. Baylor Roberts

OPPOSITE THE TRIANGLE WILL RISE ANDREW MILLON'S GIFT TO THE NATION

This vista across the main entrance of the Archives Building and along Constitution Avenue toward the Capitol is soon to be enhanced by the National Gallery of Art which together with his priceless collection the former Secretary of the Treasury has presented to his country. The new edifice will replace the frame structure of the city woodward now occupying the site of the abandoned George Washington Memorial Auditorium (right)

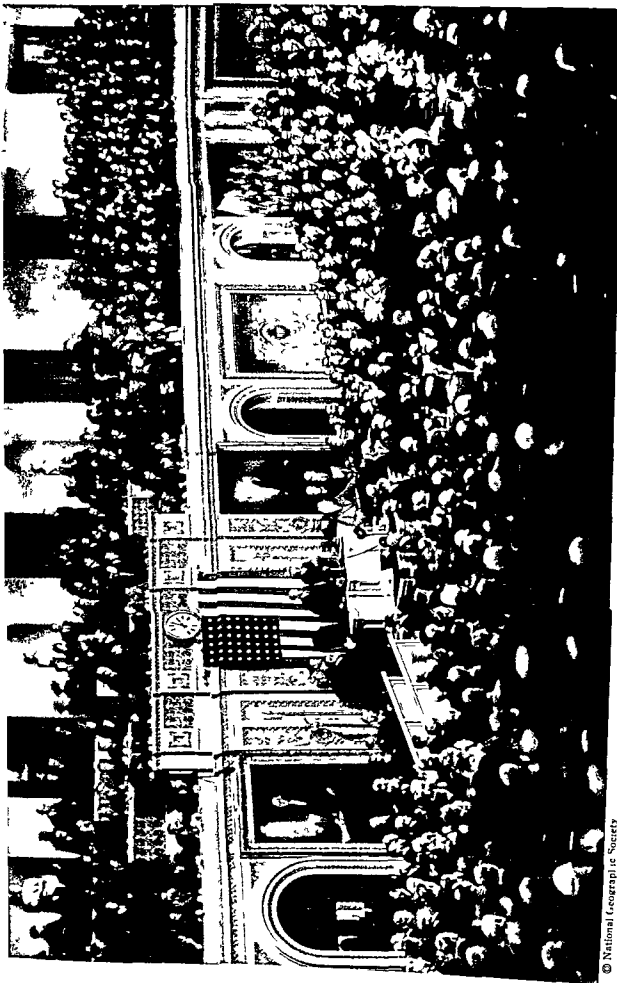


© National Geographic Society

Dufas color Photograph by J. Baylor Roberts

THE PRESIDENT LEADS THE NATION IN HOMAGE TO THE HERO KNOWN BUT TO GOD

On every Armistice Day an impressive ceremony at the Tomb of the Unknown Soldier in Arlington National Cemetery recalls that historic November 11, 1918, when was placed here the body symbolizing to Americans the spirit of unselfish devotion. The narrow beat behind the bugler blowing taps is paced by a guard of honor from sunrise to sunset daily throughout the year.



© National Geographic Society

PRESIDENT ROOSEVELT READS HIS ANNUAL MESSAGE BEFORE THE FIRST JANUARY OPENING OF A NEW CONGRESS—1937
 Never before has the color camera recorded a joint session of Senate and House in the Hall of Representatives. Speaker William B. Bankhead and Vice President John N. Garner stand at the marble Speaker's desk behind the Chief Executive. Between the flag and the painting of Washington is the Speaker's mace, a silver bound bundle of ebony rods surmounted by a silver globe on which perches a silver eagle. The portrait on the right is of Lafayette.

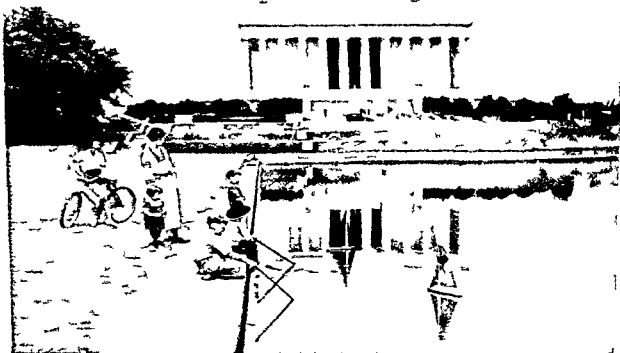


Illustration by W. A. R. C. C.

TO YOUNGSTERS THE REFLECTING POOL IS A SEA OF DELIGHT

The r toy yachts dot it in summer and sometimes in winter their skates ring upon its frozen surface. More than a third of a mile long and 160 feet wide it mirrors at this end the classic Lincoln Memorial and at the other the Washington Monument.

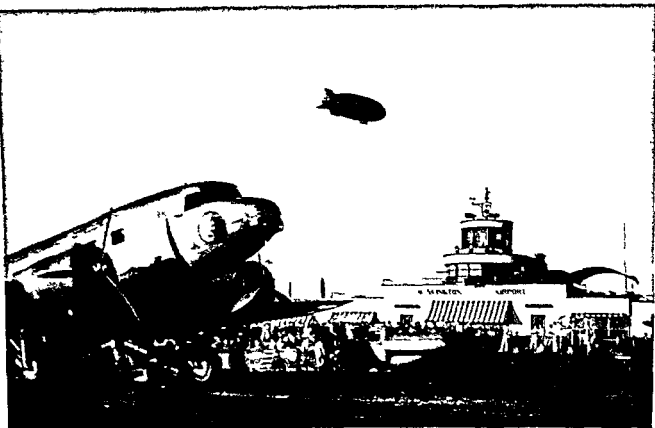


Illustration by W. A. R. C. C.

Illustration by J. Taylor Rose

THE COLOR CAMERA REVEALS HIGHLIGHTS OF MONEY MAKING

Of all Government buildings the Bureau of Engraving and Printing is a room in which there is no parallel for the first time in its history. One of the most popular with visitors. Currency printing is as fascinating as the dream inspired by the untold wealth.



WASHINGTON AIRPORT RANKS FOURTH BUSIEST IN THE UNITED STATES

Though it is unpretentious 64 planes arrive and depart from its runways daily. The large ship at the left is a 21 passenger unit of the Eastern Airways Great Silver Fleet flying between New York and Miami. Overhead sails the Goodyear blimp *Enterprise*.

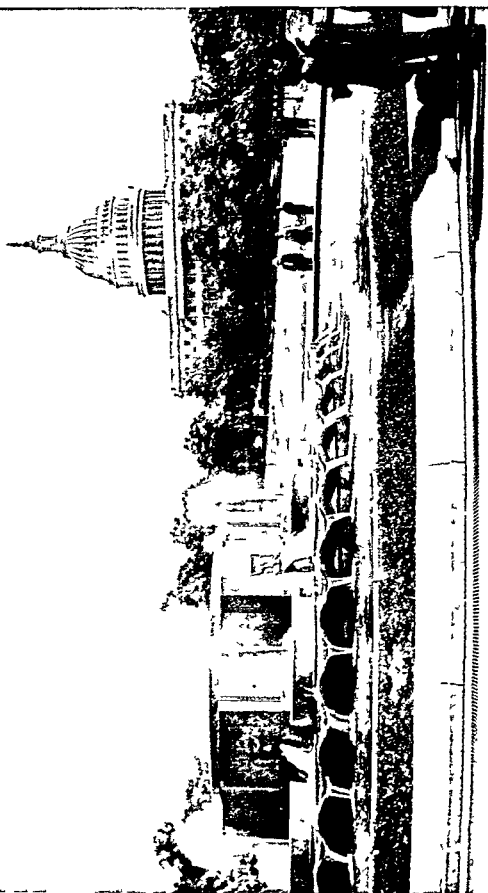


© National Geographic Society

Halfaycolor Photographs by J. Baylor Roberts

GEORGE WASHINGTON UNIVERSITY GIRLS PLAY HOCKEY ON THE ELLIPSE

One of the most popular recreant on grounds of the city park system is this area in the south part of the President's Park. Public baseball diamonds and playing fields for other sports invite the athletic minded out of doors.

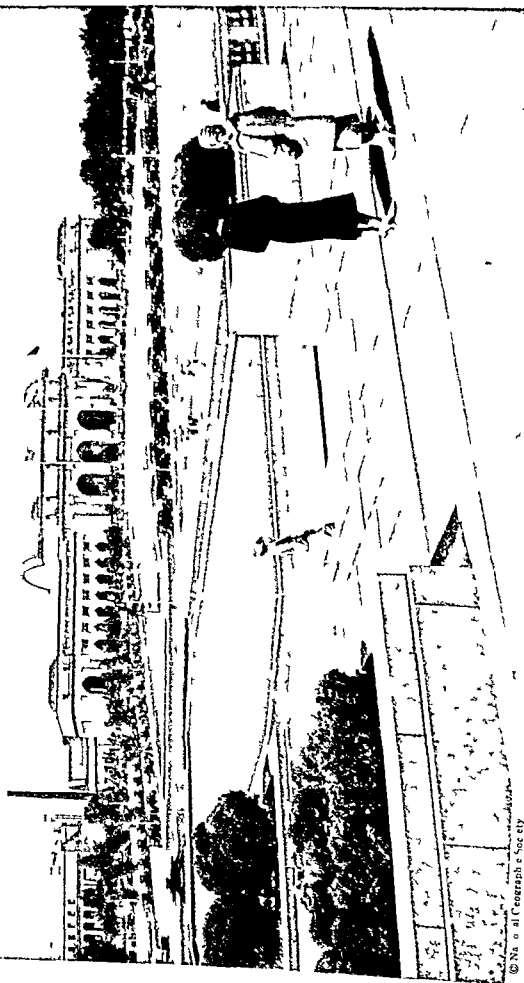


© National Geographic Society

BEHIND THIS FLORIAN FOUNTAIN 270 CONGRESSIONAL CARS ARE PARKED

Dulles or Photograph by W. H. R. C. L.

Just as in other cities, the Capitol is a beautiful sight, the curbs in the most interesting parts of Washington detracted from the beauty of the city. In Capitol Park between Union Station and the Capitol, the Government at the time seemed somewhat at by taking an underground streetcar track that formerly encircled the Senate Office Building, and a subway line, a sub street level garage for the use of those on the hill.

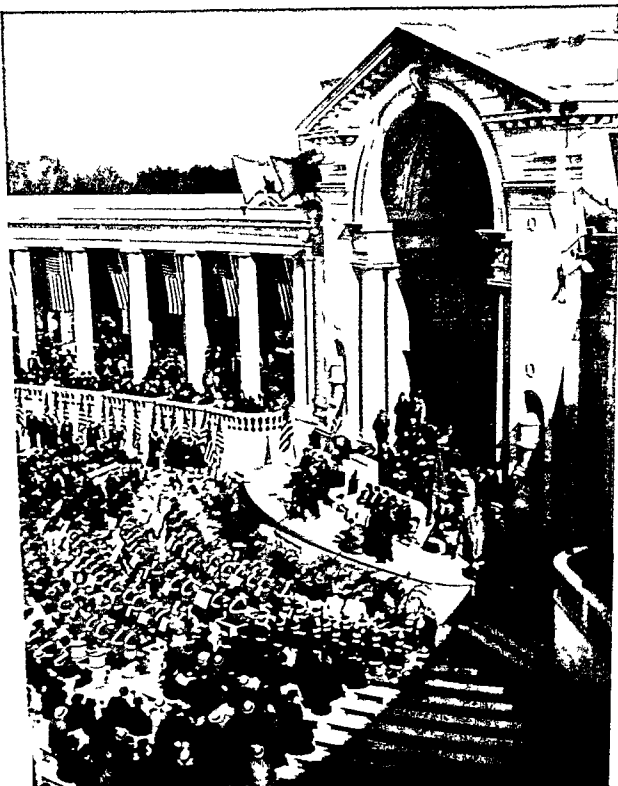


© National Geographic Society

UNION STATION AT ITS MOST GRACIOUS WELCOME TO VISITORS

A Daycolor Photograph by William C. Her

Washington presents to the traveler arriving by rail a delightful first appearance. From the main entrance there is an unobstructed view of the Capitol across the green vista of Capital Park with its handsome fountain and shrubbery (see opposite page). The monument near the station poles is the Christopher Columbus memorial.



U. S. NATIONAL CEMETERY

Detail for Engraving of Taylor R. Co.

"WHEN WE ACHIEVE THE SOLDIER WE LIE OF LAY ASIDE THE CITIZEN"

A speaker at a Memorial Day program in the Memorial Amphitheater in Arlington National Cemetery called a true "American" not American in blood, but those who carved away the age of the nation for the Grand Army of the Republic. "A true American is the one who is willing to give an American soldier a place for Memorial Day services," he said. "It is not at even men to put them. There are several 500 persons who are to be exact, there are 100,000 men who are to be exact, there are 100,000 men who are to be exact."

breathe. The sky is clean. There are no skyscrapers thrusting spear heads at it. The jesting description of early day Washington as a city of magnificent distances can now be considered only a deserved compliment.

True, the curbs in many parts of the city are lined with homeless automobiles for the parking problem in Washington is acute. There is one automobile here to every three inhabitants (Detroit has one to five, New York one to eight) and 75,000 cars are regularly parked in the streets all night.

Government offices open from 9 to 4:30 spill forth such numbers of employees that even Washington's wide streets are taxed. The city has no subways—except the tiny Senate subway for taking Senators from office to Capitol.

Some measure of relief has resulted from the staggering of working hours for different groups of employees. Yet every work day afternoon is as early as 4 o'clock. Constitution Avenue, widest and most open street in the Government office district, is clogged with cars from Pennsylvania Avenue to the Potomac, and one can imagine the multitude that jams the streets when the thousands of workers pour out of the great buildings of the Triangle (page 667).

Streetcars and buses are packed and throngs block the sidewalks where they await some means of transportation to their homes. I have seen a United States Senator hanging to a bus strap, glad to be moving and not sitting in his automobile behind a traffic jam.

RAPID CHANGES IN THE LAST DECADE

Washington has changed so rapidly in the last decade through a \$200,000,000 Government building program that even those of us who have lived here continuously have had difficulty keeping track of the shifting scenes.*

The problem faced by the Commission of Fine Arts and the builders of the new Washington is twofold. In carrying out the plan of 1901 worked out to incorporate virtually all that was feasible in Major L'Enfant's original plan, they are striving to produce the most beautiful capital in the world and at the same time to provide suitable quarters for the ever-increasing bureaus of the Federal Government.

To erect a truly graceful building large enough to house the thousands of employees of one of the major departments, such as Commerce, Interior or Agriculture is a task so difficult as to challenge the most skilled architects. There must be hundreds of offices, all with outside windows; no gloomy medieval castles will prove satisfactory. Hugeness is a physical necessity, grace an artistic obligation.

TRIANGLE COVERS TWENTY BLOCKS

To their everlasting credit the architects who have designed the new edifices have mastered seemingly impossible difficulties. The Federal Triangle, where are concentrated more official activities than in any other capital, covers an area of about twenty city blocks from its 15th Street base, the enormous Department of Commerce Building to its Sixth Street tip, the Apex Building, which is to be occupied by the Federal Trade Commission.

Within the nine buildings of this group are offices for more than 25,000 Government employees, yet despite the vastness of the structures, the development has genuine architectural attractiveness and dignity.

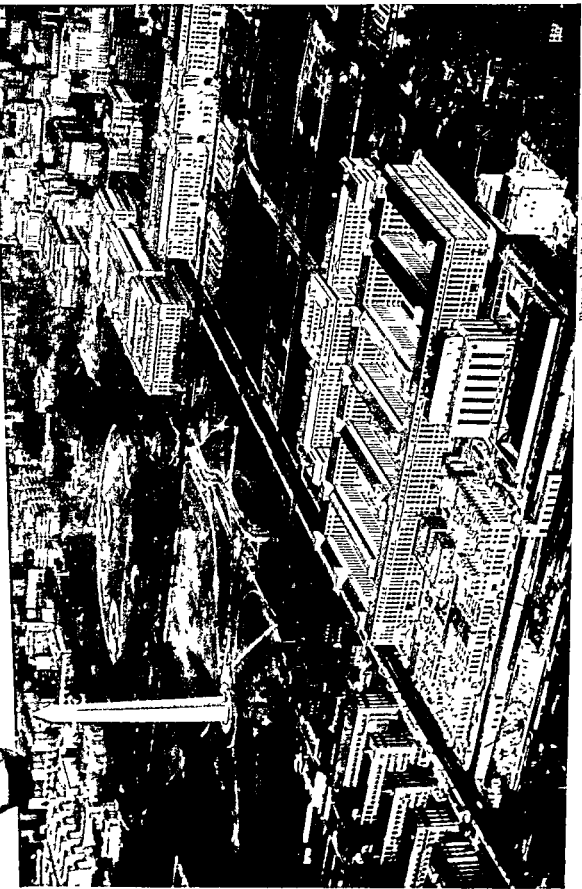
Fortunately, L'Enfant planned a Federal City with room to expand. Even the largest edifices can be made to look graceful if surrounded by grounds sufficiently spacious and the new buildings are so framed by pleasant parks and plazas that they escape the charge of crowded awkwardness.

With its new south-extensible section, the Department of Agriculture Building has become the largest government office structure in the world, housing in its 4,292 office quarters 6,450 employees, yet even in such a commodious building only about a third of the Department's Washington personnel can be brought together.

Constant expansion of activities requires an increase in Government office forces too rapid to be taken care of in any single structure, even though it be extensible by merely adding wings and be placed as is this in a 35-acre park (page 680).

Latest of the new structures to be occupied is the new Interior Department Building into which some 3,000 workers recently moved. Designed by Waddy B. Wood in consultation with Secretary Harold L. Ickes, this building departs somewhat from the classical style of its neighbors. No pillars adorn it, but setbacks providing outside walls for its many wings

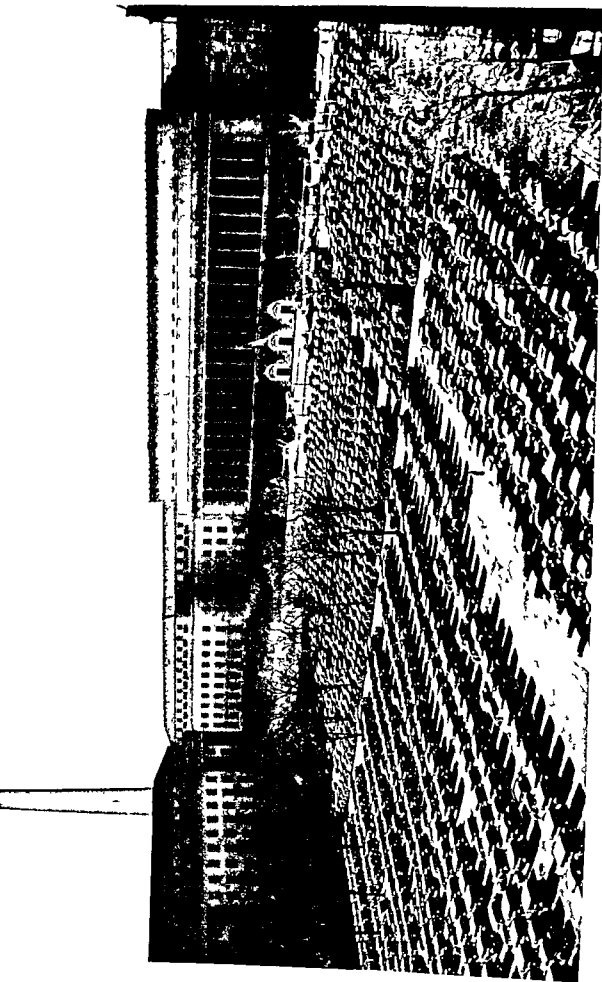
* See Wonders of the New Washington by Frederick G. Vosburgh in THE NATIONAL GEOGRAPHIC MAGAZINE for April 1935.



Photograph by B. Anthony Stewart from Good ear Airship Reliance

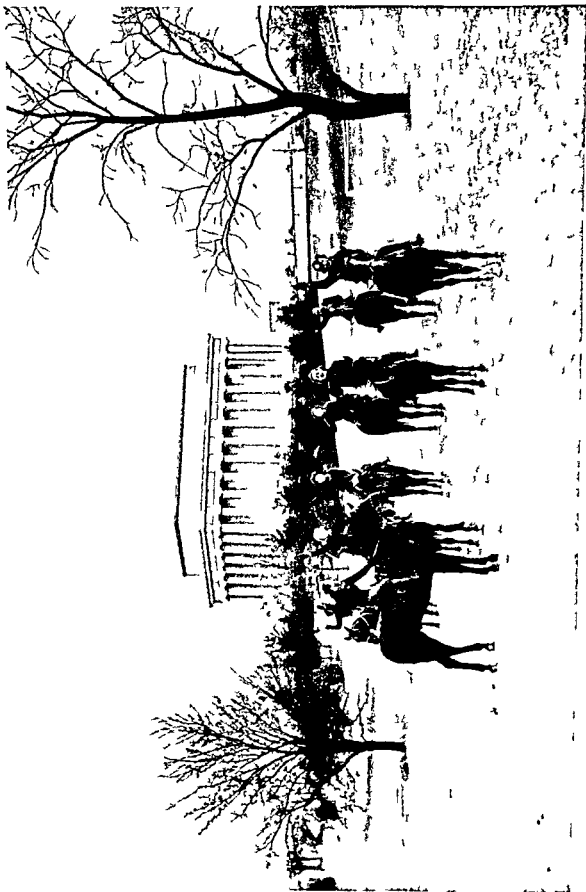
IMAGINE THIS SCENE AT OFFICE CLOSING TIME!

Largest government office building in the world, the Department of Agriculture (center) shelters 6,450 employees. Beyond the Mall to the right of the Ellipse is the Commerce Department with the Labor Department Interstate Commerce Commission just across the street from it. In the extreme upper center appears the White House. In the upper left corner are the new offices of the Interior Department. The new Central Heating Plant, with long striplike windows rises in the foreground. At the lower left is the Bureau of Engraving and Printing with its new annex under construction.



SOME 2 000 CARS AWAIT THEIR OWNERS, AT WORK IN THE NEW GOVERNMENT BUILDINGS OF THE 'TRIANGLE' Bordered in the background by the Department of Commerce Building and on the left by the home of the Labor Department this open area on 14th Street helps to solve the parking problem. It forms a hollow in the base of the giant wedge of new Federal structures and later will become a landscaped park

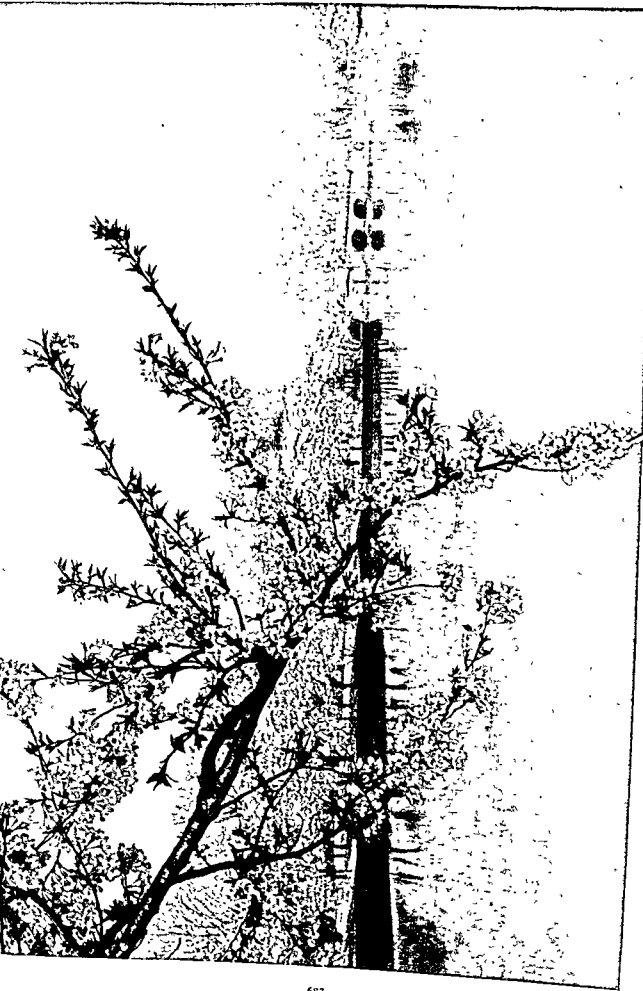
14 photograph by J. Ray for Roberts



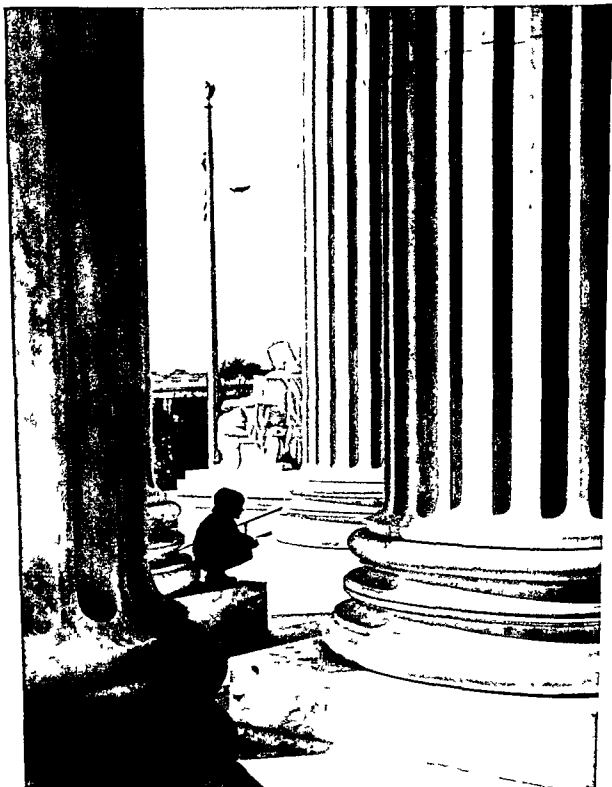
LIGHT HEARTED YOUTH GOES FOR A CANTER IN POTOMAC PARK

Photograph by J. Haydon Roberts

Near the entrance to the Lincoln Memorial a gay party of equestrians enjoys a frolic on a fine morning. Across the Potomac in a fox hunt park attracts District of Columbia enthusiasts for the sport of Washington and horseback riding is highly popular.



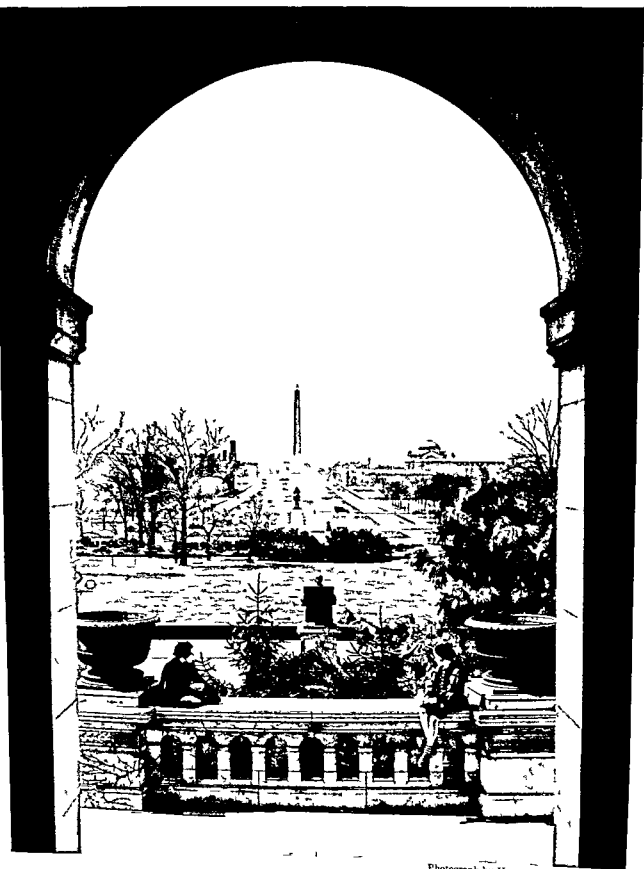
JAPANESE CHERRY BLOSSOMS FLING AN APRIL GARLAND OF LOVELINESS AROUND THE TIDAL BASIN
Photograph by Walter M. Edwards



Photograph by Harrison Howe, Walker

A NEW GENERATION CONTEMPLATES THE SUPREME COURT'S PARTHENON-ESQUE COLUMNS

This entrance, which faces the Capitol, is flanked by allegorical statues by James F. Fraser: the one stamped in the background portrays a woman meditating upon the problems of justice; the other not shown here, depicts a male figure bent to execute laws. Above drifts the flying figure from which some of the accompanying photographs were made (pages 677 and 680).



Photograph by Harrison Howell Walker

A GENERAL AND A JURIST GAZE DOWN THE VERDANT MALL

Near the center of the picture framed by an archway of the Capitol stands an equestrian statue of General Grant. On the pedestal in front of the balustrade the seated figure of Chief Justice Marshall appears. Much of the area beyond and to the right of the Grant statue recently has been cleared of unsightly buildings and transformed into park, making possible this striking vista.

give the appearance at a distance of Doric columns. Between it and the old Interior Building is Rawlins Park, now being developed as an elaborate plaza. The two structures are connected by a lighted tunnel.

It is the pride of the planners that every clerk in the new Interior Department Building will have light from an outside window, a rather remarkable feature in view of the fact that the structure covers more than five acres of ground.

This gray stone giant just north of the marble edifices that form the frame for the Lincoln Memorial is the first Government office building to be equipped with electric stairways. Two of these have been installed to carry passengers between the C Street and E Street levels and to relieve congestion during the rush hour when lunch is being served in the big cafeteria in the basement. Besides the moving stairs there are 20 high-speed elevators and 11 complete stairways. Like others recently constructed, the building has a completely automatic air conditioning system. Eventually it will contain 3,500 people.

With such a corps of workers the structure becomes virtually a city within a city. It has a telephone system now handling 2,200 main lines and 1,100 extensions. At a peak, 2,600 main lines can be served. The system is equivalent to one serving a city of 30,000.

Along the north side of broad Constitution Avenue across from the Munitions Building stand the white marble edifices described by the Commission of Fine Arts as the frame for the Lincoln Memorial. Erection of a home for the Federal Reserve Board between 20th and 21st Streets completes this composition and when eventually the temporary buildings result of war-time haste are removed, one of the major dreams of L'Enfant will be realized.

GUARDIANS OF A NATION'S HEALTH

Other splendid buildings in this frame are those occupied by the National Academy of Sciences, the Public Health Service, and the Pharmaceutical Association. Plans for an annex to the Pan American Union have been prepared.

Although a short sight seeing tour seldom includes a trip through the Public Health Service, that bureau is one that will richly repay a special visit. Within its laboratories men are constantly at work seeking out causes of diseases that menace life.

Here Dr. Edward Francis discovered the

nature and origin of tularemia or rabbit fever. Here he is now conducting a study of intermittent fevers. He has exposed himself to the bacteria of so many diseases that it seems a miracle that he still lives. Other earnest scientists are his colleagues. They work tirelessly, risking their own lives for the safety of others.

MASTERPIECES COME TO WASHINGTON

Andrew Mellon, former Secretary of the Treasury, in presenting to the Nation his collection of art, together with a \$10,000,000 building to house it, made a gift valued by experts at probably \$50,000,000. For a site, the location across Constitution Avenue from the Apex Building has been chosen (Plate I and p. 667). Mr. Mellon's magnificent gift is not to bear his name, for he has asked that it be called the National Gallery of Art, administered by a board of trustees with the title vested in the Smithsonian Institution.

Through a lifetime of study, Mr. Mellon, who celebrated in March of this year his 82d birthday anniversary, has acquired a deep and thorough knowledge of art. His selection of pictures reveals a most discriminating taste and his gifts esthetic value to the Nation is hardly to be estimated.

Among the outstanding masterpieces are two unchallenged Raphaels, the *Alba Madonna* and the *Niccolini Madonna*, the exquisite *Toilet of Venus* by Titian, Botticelli's *Adoration of the Magi*, the *Old Lady Seated in an Armchair* by Rembrandt, Van Eyck's *Annunciation*, Velasquez's *Don Juan Serrano*, and magnificent sculptures by Donatello and Pisanello. Some forty of the greatest artists in history are represented.

The *Alba Madonna*, painted in Rome in 1510, hung for many years in a convent in Naples, whence it passed successively to a Spanish viceroy, the ducal house of Alba, a London banker, and the Hermitage collection at St. Petersburg (Leningrad). Procuring what critics pronounce a bargain, Mr. Mellon bought it for \$1,166,400. It depicts the Virgin, the Infant Christ, and Saint John in an open field, the baby saint offering the Sacred Child a toy cross.

For the *Niccolini Madonna*, the price Mr. Mellon offered Lady Desborough of Hertfordshire was \$875,000. This conception of the Holy Mother and Child is tenderly human, the Virgin wearing a rose-red robe with yellow-green undersleeves and over it a blue mantle (in the hem of which is embroidered the artist's signature) and a



SPEEDBOATS ROAR ON THE POTOMAC IN THE 1936 PRESIDENT'S CUP REGATTA

Off Hains Point the historic river affords an excellent course for these annual races. September sunlight gleams on the rippling water and intensifies the flashing colors of the flag-decorated shores where thousands of spectators gather to watch the thrilling spectacle.

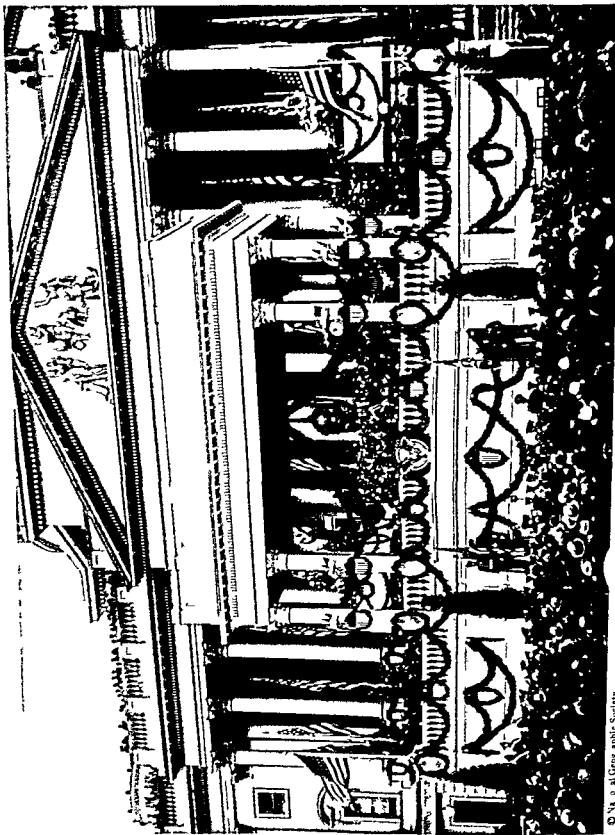


© National Geographic Society

Dufaycolor Photograph by J. Baylor Roberts

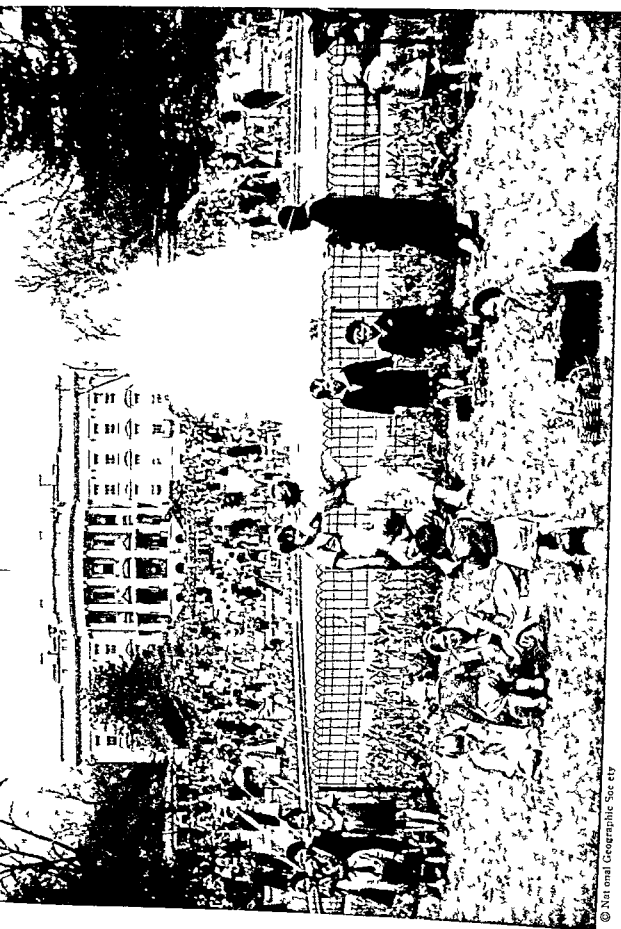
GIRL CONTESTANTS RACE THE POTOMAC IN COCKLESHELL BOATS

If the outboard motors do not become temperamental, the tiny craft dart around the course like water bugs. There are no special events for women on the Regatta program, but in 1936 one feminine competitor, Miss Molly Tyson, won a handicap race.



© National Geographic Society

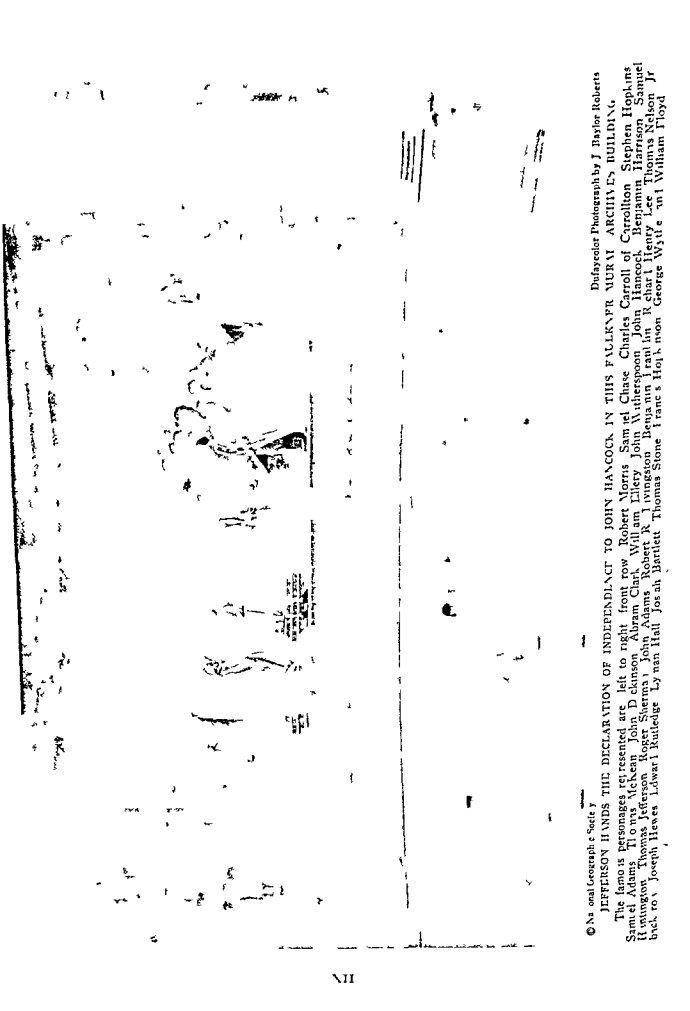
THE WHITE HOUSE WAS THE SCENE OF THE FIRST INAUGURATION OF PRESIDENT ROOSEVELT ON MARCH 4, 1933. THE LAST TO BE HELD IN MARCH WAS THAT OF PRESIDENT LINCOLN IN 1861.



© National Geographic Society

ARNOLD WITH 1 GGS CHII DRI N STORM THE WHITI HOUSL IAW N FVLRY FASTER MONDAY
Inlay Photograph by Edwin L. Wheeler

Usually the First Lady makes a little speech of welcome from the balcony and sometimes the President comes out for a word of greeting. The living quarters of the Chief Executive and his family are on the second floor. State functions are conducted in the famous rooms below.



Discolor Photograph by J Taylor Roberts
MURRAY ARCHIVES BUILDING

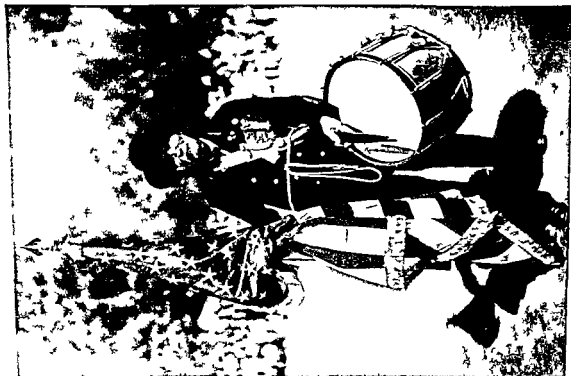
© National Geographic Society
JEFFERSON HANDS THE DECLARATION OF INDEPENDENCE TO JOHN HANCOCK IN THIS FACED FRONT ROW
The famous personages represented are left to right front row Robert Morris Samuel Chase Charles Carroll of Carrollton Stephen Hopkins
Samuel Adams Thomas Jefferson Roger Sherman John Adams Robert R Livingston Benjamin Franklin Richard Henry Lee Thomas Nelson Jr
back row Joseph Hewes Edward Rutledge Lyman Hall Josiah Bartlett Thomas Stone Francis Pickens George Wythe and William Floyd



© National Geographic Society

Dufaycolor Photograph by J. Raylor Roberts

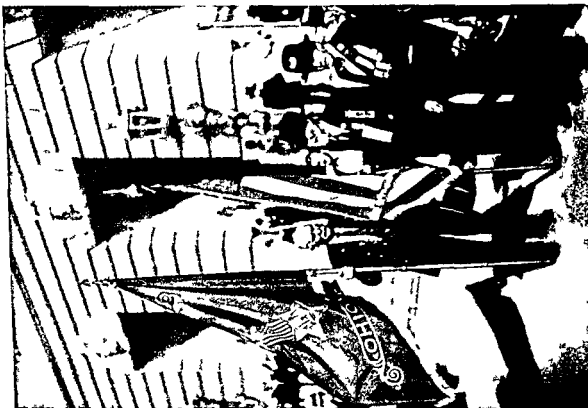
FAULKNER PRESENTS A LESSON IN HISTORY AND PATRIOTISM IN THE ARCHIVES MURAL, "THE CONSTITUTION OF THE UNITED STATES". Makers of the Nation represented are: left to right, front row, Edmund Randolph, Nathaniel Gorham, John Rutledge, James Wilson, Oliver Ellsworth, Charles Pinckney, James Madison, Elbridge Gerry, William Samuel Johnson, George Mason, George Washington, Benjamin Franklin, Rufus King, William Paterson, Charles Cotesworth Pinckney, Gouverneur Morris, Alexander Hamilton, George Read; back row, William R. Davie, John Langdon, Luther Martin, Roger Sherman, Gunning Bedford, Jr., and Abraham Baldwin.



© Vanna, Georgia Society

After three quarters of a century the spirit of 61 still lives

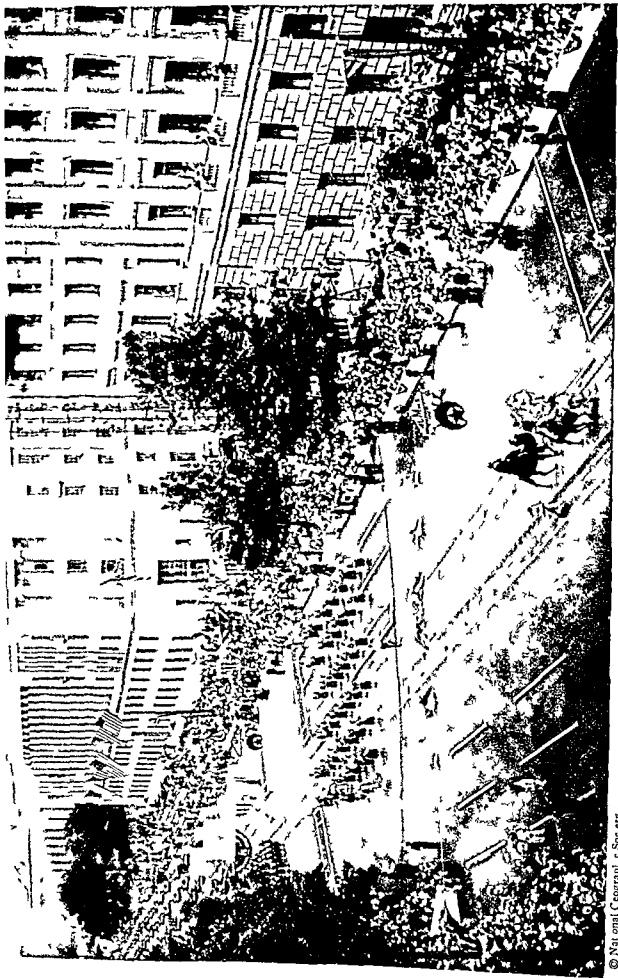
When the drumming ranks of the Grand Army of the Republic marched in Washington in September 1936 many spectators predicted sadly that the Boy's in Blue would never parade again but the veterans were determined to end with plans and voted in 1937. The men in blue's R.D. Parker Downers Grove Illinois the flagbearers from Ohio were left to fight life in the R sell. All since Frank Morris, Canton and W.H. Le Canton



Dailycolor Photograph by J. Taylor Roberts

After three quarters of a century the spirit of 61 still lives

When the drumming ranks of the Grand Army of the Republic marched in Washington in September 1936 many spectators predicted sadly that the Boy's in Blue would never parade again but the veterans were determined to end with plans and voted in 1937. The men in blue's R.D. Parker Downers Grove Illinois the flagbearers from Ohio were left to fight life in the R sell. All since Frank Morris, Canton and W.H. Le Canton



© National Geographic Society

ALL WASHINGTON LOVES A PARADE—HAIL TO THE SHERIFFS IN 1935!

Finlay Photograph by J. A. Varden

As the brilliant units of the procession march along Pennsylvania Avenue past the new Archives (left background) Department of Justice and Internal Revenue Buildings throngs almost as great as an inaugural crowd greet them. Laborate grandstands covered and uncovered, offer seats at prices that would give pause to a theater first night.



© National Geographic Society

CHILDREN OF 23 FOREIGN COUNTRIES AND LEGATIONS SOUVENIR IN NATIVE COSTUMES WISH MERRY YULI TID TO THE WORLD
They are broadcasting the Fifth International Children's Good will program in their own languages, December 21, 1936. Sahiko, daughter of the Ambassador of Japan, is in the foreground, playing a stringed instrument in the cherry blossom festival in April, 1937.

playful child symbolizing the Infant Jesus

Besides the *Old Lady Seated in an Arm chair* the list includes several other Rembrandts among them the *Death of Lucretia* often described as the canvas painted in gold a splendid *Self Portrait* depicting the Dutch master in 1659 when trouble had put its lines upon his face and a *Portrait of a Young Man* dated 1662

Frans Hals is represented by a number of pictures of which probably the best known is the *Portrait of an Old Lady with a Prayer Book* This sympathetic interpretation of serene old age is signed under date of 1633

Mr Mellon has expressed the wish to have his art treasures displayed in a building so comfortably arranged and fitted that visitors will not suffer museum fatigue and with this idea in mind the architect John Russell Pope has designed a perfectly lighted edifice of spacious halls with numerous seats where guests may rest while looking at the displays

Any discussion of Washington art treasures must include at least mention of the Corcoran Gallery of Art the Phillips Memorial Gallery, the Freer Gallery of Art and the National Collection of Fine Arts formerly the National Gallery of Art All are distinctive In the Phillips Gallery the pictures are hung as they would be in a home

THE CITY OUTGROWS ITSELF

Washington circles parks and plazas are adorned with many memorials some of outstanding artistic merit For those interested in sculpture and other decorative arts the city offers a field for months of study

Washington finds itself changed since the World War from a rather sleepy southern town to a bustling metropolis When bureaus grow as the Internal Revenue has from 2 000 people to 10 000 in ten years it becomes necessary to provide homes and office space for them

For nearly a century and a half the dream of L'Enfant of a perfectly planned Federal City has been progressing toward fulfillment It is still far from complete may never reach accomplishment in this generation but as interpreted by the plan of 1901 it assures a Washington growing in beauty as well as stature

Aside from the official part of Washington which belongs of a right to the Nation there is a familiar part which endears the city to its inhabitants They are not pro-

vincial folk so far as their present place of residence is concerned Perhaps the majority of them are exiles in a foreign land reserving their provincialisms for back home

The population includes 112,000 Government employees many of whom are more or less transients here, though thousands devote their lives to the Government service Only about 8 000 persons are employed in industry In view of these facts it is easy to understand why there is so little of vaunting local pride so much of nostalgia for the Pacific coast the Middle West the South the Northern and Eastern States

Virtually every Commonwealth of the Nation is represented by a State society in Washington These organizations conduct social affairs at which opportunity is afforded for back home folk to get together As the city is a show place of national activities its population is a cross section of the people of the United States Practically every civilized nation is represented by a diplomatic delegation

For those of us who claim Washington as our home the city has a definite appeal not in any way connected with the political generations that come and go

Since we cannot vote we have no active part in political affairs Administrations change but the changes affect us little save by taking away friends and bringing in strangers with whom we soon become acquainted

WHAT A WASHINGTONIAN REMEMBERS

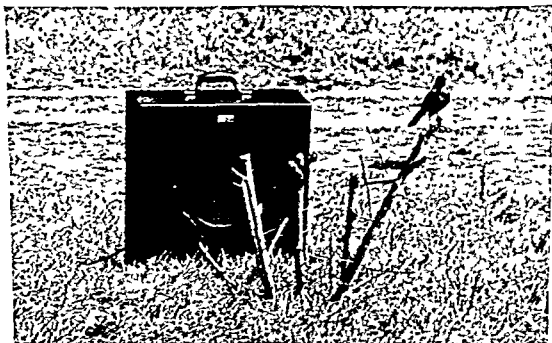
If I should leave Washington I suspect that some of the less important bits of experience here would linger in my memory longer than important public events

These things should I remember always negroes dancing in the street on Halloween the glow of flowers on green lawns the easy drawl of a speech neither truly southern nor yet of the north the flash of a cardinal in the trees of a park the song of a warbler beneath my office window the lights of the city as I approached it from Arlington over the Memorial Bridge fireworks in the Washington Monument grounds the worn old leather chairs brought by Supreme Court Justices to their new marble temple the mauve of fading light on the Japanese cherry blossoms and most precious of all the somber glory of the Lincoln Memorial darkling above its image in the reflecting pool



A GOLDEN EAGLE SCREAMS AT THE MICROPHONE.

Contrary to popular belief these eagles are shy birds and only because of their extreme wariness have they been able to persist in most parts of the Rocky Mountain region. Usually they nest on inaccessible ledges but occasionally in the tops of tall trees. Their outcry is rather disappointing. This youngster has only recently left the nest (page 712).



A PLZZLED MOCKINGBIRD SEEKS A RIVAL IN A LOUD-SPEAKER

The bird heard his own voice which had been previously recorded coming out of the instrument and, thinking it an interloper in his territory, darted at the offending case to drive it away. Round and round he fluttered, hunting for the other bird, until finally, completely flabbergasted, he stood thus—with his bill open yet not daring to sing (page 699).

HUNTING WITH A MICROPHONE THE VOICES OF VANISHING BIRDS

BY ARTHUR A ALLEN

Professor of Ornithology Cornell University

With Illustrations from Photographs by the Author

ALMOST within the memory of men still living, four species of North American birds have become extinct. In our museums will be found the dried skins or mounted specimens of the great auk, the Labrador duck, the passenger pigeon, and the heath hen. The Carolina parakeet seems about to follow them.*

Until only a few years ago the tooting of the heath hen could be heard each spring on the island of Martha's Vineyard, but the thought of preserving its voice, in addition to its photographic image and stuffed effigy, never entered anyone's mind.

Yet there are many Nature lovers interested in the living bird as well as in its plumage and classification who would like to know what sounds it made when it inflated the tin balloons on the sides of its neck and stamped its feet and flirled its tail.

They would like to know what sounds were made by the millions of passenger pigeons described by Audubon and Wilson as darkening the sky for hours at a time. They would like to listen to the call of the Labrador duck and the other species that are gone forever.

And today there are other birds still living which seem unable to compete with the march of civilization and which our children may know only as museum specimens. Should not their voices be preserved before it is too late?

As we were talking this over one winter evening when I was beginning to plan a sabbatical leave from the University, my good friend Albert R. Brand suggested that

a worthwhile undertaking would be the all-time preservation of the voices of vanishing birds.

The idea grew and soon we had a hunting expedition well in mind—an expedition which would leave guns at home and would shoot the birds with cameras, microphones and binoculars its object specimens of bird voices preserved on film, with such photographs, motion pictures and field observations as would elucidate the habits and appearance of the living birds and determine better methods for their conservation.

The American Museum of Natural History, of which Mr. Brand is an Associate in Ornithology, approved of the project. The National Association of Audubon Societies gave us its blessing. Mr. Duncan Read loaned us additional motion picture cameras and the Brand-Cornell University American Museum of Natural History Ornithological Expedition was born.

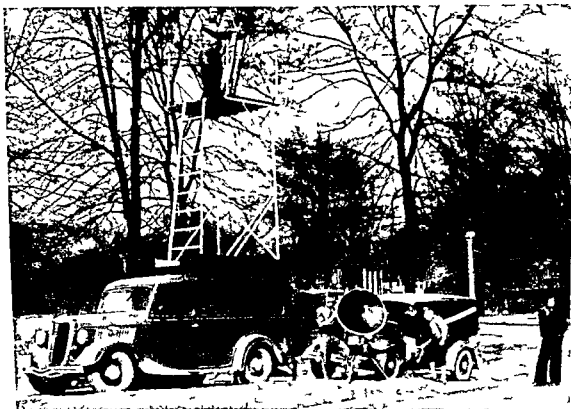
BIRD VOCALISTS PROVE TEMPERAMENTAL

We had already had opportunity to learn something of the work we were undertaking. Not long after the first sound pictures appeared on the screen about ten years ago an attempt was made by a well-known motion picture company to obtain a film release of singing birds as a demonstration of the quality of its sound recording cameras.

It is one thing however to invite an opera singer to step before the microphone and quite another to order a wild bird to do the same thing. For nearly two weeks two of their best operators equipped with a sound truck struggled with the problem but just as they got their cameras and microphones into action the singing birds flew away.

Finally patience exhausted they came to our Laboratory of Ornithology at Cornell for help thinking that our knowledge of birds might supplement their knowledge of sound recording with desirable results. To make a long story short we were able to

*These ill-fated species have been described in detail in previous issues of THE NATIONAL GEOGRAPHIC MAGAZINE. The Passenger Pigeon and the Heath Hen (under Prairie Chicken) were included in Game Birds of Prairie Forest and Tundra by Alexander Wetmore in The Magazine for October 1936. The Carolina Parakeet in Parrots Kingfishers and Flycatchers by Dr. Wetmore June 1936. The Great Auk in Birds of the Northern Seas by Dr. Wetmore January 1936. and the Labrador Duck in Far Flying Wild Fowl and Their Foes by Maj. Allan Brooks October 1934.



THE CORNELL UNIVERSITY AMERICAN MUSEUM OF NATURAL HISTORY ORNITHOLOGICAL EXPEDITION MAKES A ROADSIDE STOP

With the object of securing permanent records of the voices of vanishing species of birds and filming their habits the Cornell ornithologists left Ithaca New York the middle of February 1935 and traveled 15 000 miles circling much of the United States in their quest The truck at the left equipped for camping and photography had a collapsible tower on its roof to bring the photographer on a level with the tree tops the truck at the right was equipped for sound recording The microphone was supplemented by a large parabolic reflector shown between the trucks

help, and became so interested in the problem that we conceived the idea of making a permanent record of the songs of all North American birds

This was not the province of the movie men, however, we were quickly assured They now had enough film of singing birds for one release and that was as far as they desired to go We could buy the truck for \$30 000 and do it ourselves if we wished But we didn't have the funds

And so the problem rested until Albert Brand entered the picture with a love of birds in his heart and a desire to learn their songs He studied with us at Cornell for a couple of years saw the writing on the wall and decided his would be the problem of filming the songs of North American birds Furthermore, he would record the songs from the films on phonograph disks so that they would be available to anyone who wanted them.

We little realized all the intricacies of the problem when we first started assembling the instruments necessary for this delicate kind of recording But our colleagues at Cornell in the College of Engineering, Professors W C Ballard and True McLean, and Mr Arthur Stallman, were very helpful

Soon with their aid we were embarked on a project that was to prove as fascinating as it was difficult, and as time-consuming as it was productive and that finally took us 15 000 miles with our sound truck and cameras in 1935 in an effort to record the voices of certain birds that are threatened with extinction

SEEKING THE RARE IVORY BILLED WOODPECKER

By the middle of February we were fully equipped and had started work in central Florida Mr Paul Kellogg, instructor in ornithology at Cornell and an expert in

sound recording, had been assigned to the expedition by the Dean of the College as the sound technician. Dr. George Sutton, Curator of Birds at Cornell, was to accompany the expedition as bird artist until we should find the ivory-billed woodpecker—a rather indefinite commission. James Tanner, a graduate student in ornithology at Cornell, was to accompany the expedition as general handy man to assist in both the sound recording and the photography. Mr. Brand and the author were to plan the itinerary and take charge of the photography and the ornithological observations.

One of the first objects of the expedition was the rediscovery of the ivory-billed woodpecker, perhaps the rarest of the North American birds and at one time thought to be extinct.*

In central Florida in 1924 the author and Mrs. Allen had discovered a pair that were later collected by local taxidermists and the expedition planned to spend March in the same general region of Florida searching for another survivor. Whenever conditions were suitable, of course, we would catch the songs of other birds as well.

LEAVES NO LONGER WHISPER, THEY SHOUT

It must be realized that when the song of a bird is amplified enough to cause a recording lamp to flicker sufficiently to make a record on the film, every other sound is amplified too. Many a time records of beautifully clear songs are rendered worthless by the passing of an automobile a block away or even by the rustling of a slight breeze among the leaves. The whispering leaves of the poets are shouting leaves to the sound recorder; the babbling brooks no longer babble—they roar.

So each morning we arose at daybreak before the milk trucks, the tractors, the roosters, the hounds, and the innumerable other sounds of civilization became too frequent and recorded the voices of such familiar Florida birds as the mockingbird, the cardinal, the Florida wren, and the ground dove.

When conditions were inauspicious for recording we spent long hours and covered many miles hunting for ivorybills. On some of these trips we obtained records or films of such unusual species as the sand-

hill crane, the southern bald eagle, the American egret, the wood ibis, and the Audubon's curacara, which is near the northern limit of its range on the Kissimmee Prairie.

Nor were our labors ended with the setting sun, for we were always looking for ideal conditions to record the evening concerts of the barred owls, the hawks, and the chuck-will's widows.

One of the unusual places we visited in Florida was 'Manywings,' the home of Mr. W. E. Browne near Grandin. Here the familiar garden birds have grown so tame that they come to his call, and nine or ten species have learned to catch from the air fragments of peanuts which he tosses to them (page 702).

The blue jays, which are particularly wary in most places, are especially adept at darting from the trees like flycatchers to snatch the titbits in mid-air. Most remarkable of all is the tameness of a Florida crane which comes to the back door for cornbread.

While we were recording the voices of some of Mr. Browne's birds and the truck door stood open, an inquisitive Florida wren so quickly accepted us into the family that she carried nesting material into the truck. Before Mr. Kellogg realized it she had made a good start on her nest at his elbow, as if she would induce him to remain and make his home with her. What greater show of hospitality has Florida to offer?

CHALLENGING AN UNSEEN RIVAL

Quite different was our experience in Winter Park when we were testing some of the film we had exposed. We had our projector set up inside the house with the window partly open. One after another the songs of different Florida birds poured from the loud speaker with nothing to disturb our critical ears until the song of a mockingbird came on.

Then, as the liquid notes began to vibrate across the room we became aware of a tapping at the window and there, fluttering against the pane, was our favorite garden mocker bristling with resentment. This house and garden were his, and he obviously objected to any other mockingbird singing in his territory.

When we placed the loud speaker in the garden and played the mockingbird's song again, it was almost pathetic to watch the

* See *Woodpeckers, Friends of Our Forests* by T. Gilbert Pearson, NATIONAL GEOGRAPHIC MAGAZINE, April 1933.



JOE HOWELL LOOKS IN ON A CARACARA'S NEST

It is a difficult climb to the top of a cabbage palm, but the investigator negotiated the smooth bark, the rough crown, and the sharp fans to get a glimpse of the young birds about ready to leave home (pp. 62-3). He discovered that they had been banded, each bearing a number recorded by the Bureau of Biological Survey at Washington, D. C. A vulturelike bird of prey, Audubon's caracara, captures snakes, lizards, and other animals, or joins buzzards feeding on carrion.

bird's amazement when he flew at the song but could find no bird on which to vent his wrath (page 696).

In Florida we were unsuccessful in our search for the ivory-billed woodpecker. If it still occurs in this part of its former range it will take keener ears or luckier observers than we to find it.

So the last of March we started for Louisiana, where Dr. T. Gilbert Pearson had reported the finding of an ivorybill by Massey D. Spencer near the Tensas River in 1932.

On our way we stopped at Beatchton, Georgia, at the charming home of Herbert

Stoddard, the great authority on the bobwhite. He had arranged with Col. J. S. Thompson to bait up a flock of wild turkeys on a chufa patch in a clearing on his plantation so that we could secure motion pictures and voice recordings of these shy, absolutely feral birds uncontaminated by any domestic blood.*

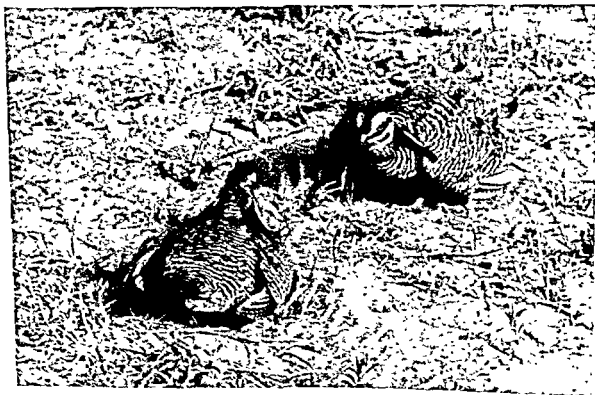
One familiar only with domestic turkeys little realizes the wariness of these grand old birds, or the stealth necessary to get within camera distance.

* See "Game Birds of Prairie Forest and Tundra" by Alexander Wetmore, NATIONAL GEOGRAPHIC MAGAZINE, October 1934.



WILD TURKEY GOBBLERS STRUTTED UNCONCERNEDLY BEFORE THE MICROPHONE

With corn and peanuts the birds were baited to this clearing in the forest on the Colonel Thompson estate at Thomasville, Georgia, by Herbert Stoddard and Albert Stringer. The sound truck and cameras were concealed in blinds built two weeks before



LESSER PRAIRIE CHICKENS CROUCH FOR ATTACK WITH WARLIKE GOBBLERS

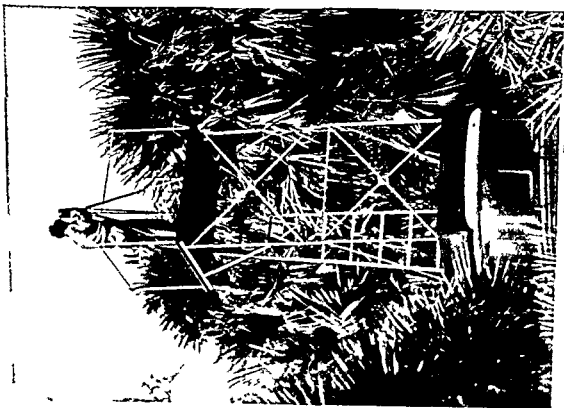
In spring the males repair to flat-topped knolls in groups of from four to as many as 40. Each bird sets up a little domain some 25 feet square and proceeds to fight with all his neighbors. Thus the boundaries become fixed, and each learns to respect the rights of others, so that when the females arrive after six weeks of battle, there is no grand rush (page 711).



1. Holograph from W. E. Browne

BLUE JAYS CAPTURE TITBITS ON THE WING

W. E. Browne of Grandin, Florida, has trained many of his birds to catch fragments of peanuts tossed into the air. While the expedition was recording the voices of some of Mr. Browne's feathered friends, a Florida *Wren* became intrigued with the sound truck and started a nest in it (page 699).



The tower by Arthur A. Allen

PAUL AILING FAUSDROPS ON A CARACARA NEST

The tower which folded up into the box on top of the truck could be erected in ten minutes and raise the photographer 20 feet into the air thus saving the birds from the danger of climbing. The caracara's name comes from its call "ah-ah" which to Dr. Allen sounded more like "bluh bluh."



IT I LITD FROM TILL MOTION PICTURE CAMLRA

This young cartara which A R Brand sponsor of the expedition is holding led the party a merry chase through the saw palmettos when they tried to catch it to return it to the nest from which it had been frightened When uttering its hoarse rasping call the bird throws its head back like an opera singer



A LOUISIANA HERON PRESENTS A TWIG TO HIS LADY

Nesting material is scarce in the 40 acre rookery which E A McIlhenny maintains for herons and egrets at Avery Island Nicknamed Lady of the Waters the graceful Louisiana heron has a slaty purple plumage that contrasts with its snowy head plumes and white underfeathering



AOW AOW THE LIMPKIN CRIES LIKE SOMEONE HAVING A TOOTH PULLED

The weird sound may be the origin of many a superstition connected with Florida's swamps and savannas where this noisy crying bird lives. When flying the limpkin's wings flap jerkily up and down like those of a mechanical toy. The long-legged wader's favorite food is a large fresh water snail which it extracts without breaking the shell.

Fortunately for us Colonel Thompson had directed his superintendent Albert Stringer to build a blind of pine boughs two weeks before our arrival so that the turkeys would have time to get accustomed to it.

Corn and peanuts were scattered some 20 yards in front of the blind each day and when we arrived we found many signs of turkeys, deer, quail, squirrels and mourning doves that had been frequenting the spot.

NOT A GOOD GOBBLING MORNING

The day before we planned to make our record the sound truck was driven into the blind and I completely concealed the cable was stretched 250 feet to another blind where I could sit with Mr. Stoddard and aim the sound reflector at the gobblers when they should come off their roosts and advance toward the field. In the hope of attracting a gobbler within record range

Stoddard armed himself with his turkey call and imitated the sound of a hen turkey.

But turkeys are capricious birds. Turkey hunters will tell you that certain days are good gobbling mornings and on other days not a gobble will be heard. Not one of the three days at our disposal proved to be a good gobbling morning and we had to content ourselves with mediocre sound though we obtained some good film of a flock of hen turkeys and two magnificent old gobblers (page 701).

It was interesting to watch from ambush their varying responses to the different morning sounds. To most they paid slight attention but at anything suggestive of human presence they were extremely wary. Instantaneously they would change from full display when they were the most conspicuous objects on the landscape to sleek, trim creatures that miraculously disappeared into their environment as if they had been swallowed by the earth.



TO "SHOOT" THESE WOOD IBISES, THE AUTHOR STOOD WAIST DEEP IN A SWAMP

Flocks of the finthead silent ghost of Florida marshlands are often seen in the skies soaring in great circles like buzzards. It was difficult to get the sound truck near the birds but this made little difference because they are virtually voiceless when fully grown. Breeding in colonies sometimes numbering several thousand pairs they nest year after year on the same platforms of sticks built high in trees. When fishing in a pond the wood ibis often muddies the water with its feet to force fish to the surface. It is the only stork found nesting in the United States.

Their eyes, which are extremely quick to notice any motion, are apparently not very keen at seeing objects at rest. On one occasion two old gobblers approached within thirty yards of Stoddard and me as we crouched immovable behind the sound mirror in full view.

RECORDING THE LIMPKIN'S EERIE CRY

From Beachton, at Stoddard's suggestion, we went south to the Wakulla River Florida where we hoped to get within recording distance of the limpkin or crying bird, another of the main objectives of our trip.

Here a magnificent underground stream, crystal clear, comes to the surface as a spring 185 feet deep and flows gently to the Gulf. Its waters teem with fish which can be observed easily even at considerable depth. The banks of the river are clothed with beautiful moss covered cypress where hundreds of anhingas, or snakebirds, nest,

as well as many herons, ospreys and other fish eating birds.

Most interesting of all however, are the limpkins. About the size of bitterns but related to the cranes they are dark brown spangled with white. They have been attracted to this beautiful stream by the abundance of a large aquatic snail (*Amipul laria*, now called *Pomacea*), which is their principal food (opposite page).

The snails are largely nocturnal and so are the limpkins. At night the loud wailing cries of the birds reverberate up and down the river sending shivers down one's back. It would not be difficult even for the most prosaic person to imagine that some lost soul had come back to earth or at least that some luckless black brother was losing his leg to an alligator.

Here enthralled by the magical scenery which was rendered even more eerie by the hooting and laughing of the barred owls, we

spent several days. We had little difficulty in recording the weird cries of the limpkin and filming its habits, as well as those of the snakebirds, ospreys, and Ward's herons.

From the Wakulla River our expedition proceeded to northern Louisiana, which we found largely under water, with all but the improved roads impassable to our trucks. The stickiness of this Louisiana mud, or "gumbo" as it is called, is exceeded only by its hardness when it is thoroughly dried out. Then it is as hard as stone, and in a dry season one can drive anywhere, but let a little water fall upon it and one sinks in it almost literally up to the knees.

So here our search for the ivorybill was greatly retarded, and had it not been for the kind offices of our friend Mason Spencer, the local representative in the State Legislature, and J. J. Kuhn, a member of the State Conservation Department, our hunt would probably have been in vain.

FOUND THE ELUSIVE IVORYBILL

As it happened, however, we spent but three days tramping through the jungle before we not only located a pair of ivorybills but actually found the nesting cavity 43 feet from the ground in a dead swamp maple. Furthermore, the nest was only seven miles from an improved road, which, in an unbroken forest 18 miles wide and 30 miles long, was indeed fortunate.

It was obviously impossible to consider taking the sound truck, with its 1500 pounds of equipment, into the swamp, but it was not beyond possibility to consider getting in with a wagon and a few mules.

The mayor and sheriff of the nearest town where electricity was available entered into the project with enthusiasm. They offered us the jail and its courtyard in which to dismantle the truck, unsolder all the connections, and set up the equipment in a wagon.

We furnished much amusement to the inmates of the jail as we worked, and when word of our objective got around, several of them volunteered confidentially the information that they could show us more of these "peckerwoods" if we could arrange a leave of absence for them with the jailer.

It required a day to eviscerate the truck and another day with four stalwart mules to haul the wagon into the swamp and set up our unique sound laboratory within 300 feet of the ivorybill's nest.

Here we camped for eight days, piling up palmetto fans on the roots of a giant oak to keep our blankets out of the water. Twenty-four power binoculars, mounted on a tripod and focused on the nest tree, kept us informed of all the happenings, while the sound mirror brought us the calls. We christened our location "Camp Ephelus" in honor of the scientific name of this rarest North American bird—*Campephilus principalis* (page 711).

Gradually the birds became somewhat accustomed to our presence and we dared build a blind in the top of a rock elm on a level with the nest and only twenty feet away. It was a thrilling experience to sit and listen to the conversations and watch at such close range the exchange of courtesies as these strikingly beautiful birds changed places on the eggs (pages 712, 713).

The brilliant scarlet crest of the male, the gleaming yellow eye, the enormous ivory white bill, the glossy black plumage with the snowy white lines from the head meeting in the glistening white of the wings are as vividly pictured in my mind as if I were still sitting on that narrow board in the tree top, not daring to shift my weight and feeling it gradually bifurcating me with wedgelike efficiency.

For five days we recorded all the happenings at the nest, taking turns with the glasses so that not a moment's observations would be missed, hoping we might discover some clue as to why the birds are apparently unsuccessful in rearing young.

But all the events were rather common place. Each morning at 6:30 the male bird tapped on the inside of the nest hole, as he grew more impatient he stuck his head out and gave a few "vaps" or "kents" in no uncertain tone, but he never left his post until the female arrived.

A little intimate conversation then ensued, and she entered, but before he took off through the forest he often spent 15 or 20 minutes arranging his plumage and scratching as if he were infested with mites. Thus, we later discovered, must have been the case.

MRS IVORYBILL OUT ALL NIGHT

During the day the two birds took turns incubating in about two-hour shifts, but the female always arranged it so that she could leave for the night at 4:30 p. m. and not return until the following morning at 6:30.



PART OF THE ROAD TO THE IVORYBILLS NEST WAS UNDER WATER

One of the expedition's chief objects was to record the voice of the rare ivory billed woodpecker. The almost total disappearance of this magnificent bird baffles ornithologists. Once locally abundant it is now found in a few isolated swamps. To locate a nest Dr. Allen searched for the large chunks of bark which the bird strips from trees. A mule team dragged the expedition's equipment through sticky mud to the nest.



READY TO RECORD A RARE VOICE

James Tanner points the apparatus at the ivory-billed woodpeckers' nest so that all of their vocabulary can be recorded when they change places on the eggs. The microphone is hung at the focal point of the parabolic reflector and the mirror is sighted at the birds through the telescope on one side.

At least this was the schedule every day during the time that we observed them.

We wanted to remain with the ivory-bills until their eggs hatched and the young were reared. But we heard from our friend Verne Davison that if we wished to study and record the lesser prairie chickens in western Oklahoma we must hasten on so as to get there before the first of May.

So torn between two desires and anxious to make the most of all opportunities, we sent for the mules and broke camp planning to return in three weeks when the young should be nearly fledged. In two

days we had our sound truck reassembled in preparation for the work in Oklahoma.

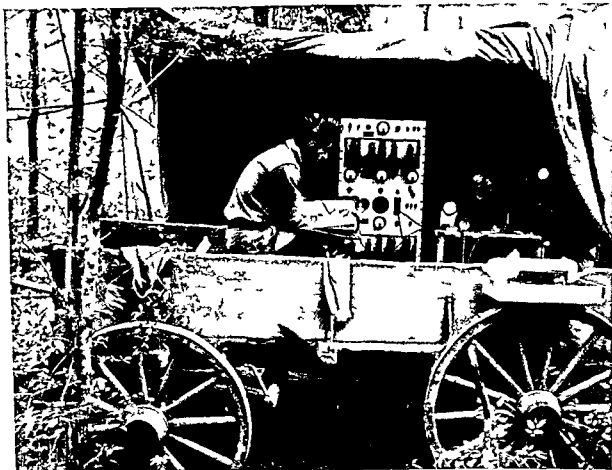
At this time, however, dust storms were raging on the prairie, and we delayed our journey to accept the kind invitation of E. A. McIlhenny to visit his beautiful estate and bird sanctuary at Avery Island, Louisiana. Here we spent three enchanting days recording the daily life in his Bird City.

This is an amazing object lesson in bird protection, showing what man can accomplish through thoughtfulness and kindness toward bird life. Beginning 35 years ago when the snowy heron had become quite rare, Mr. McIlhenny has gradually built up a large colony on an artificial pond of his own creation.

At the time of our visit in late April it certainly numbered 10,000 birds, and as many again, we were told, were yet to come (pages 703, 710).

A BULL ALLIGATOR'S FEARSOME BELLOW

Here we recorded the curious froglike croakings of the snowy egrets and by unusual good fortune captured the bellow of a huge bull alligator. It is a thrilling sound—like the roar of a lion, but rendered more terrifying by the sight of the churning water and it certainly must be effective in intimidating lesser male alligators and



CAMP EPHILUS ' WAS NAMED IN HONOR OF THE IVORYBILL

To get to the nest which was seven miles from an improved road in a forest 30 miles long and 18 miles wide the party had to transfer all equipment to a farm wagon hauled by four mules. The wagon became the sound laboratory and the camp was christened with the generic name of the bird sought (page 706)

keeping them from the chosen territory.

The bull alligator lies at the surface of the water inflating the large air sacs on the sides of his neck. He then submerges his ponderous body while the armored head and tail protrude menacingly. Thereupon he emits his thunder while the heavy plates on his back seem to vibrate and cause the water above to dance and shoot spray into the air (page 710)

It was now the last of April and another message from Davison started us westward though we were loath to leave our genial host and his marvelous bird sanctuary.

When we reached western Oklahoma a dull fog gradually obscured the landscape and as the wind whipped over the barren fields and swirled across the road we realized that we were in the midst of a real Panhandle dust storm.

Furthermore the storm continued without much abatement for seven of the eight days that we spent on the Davison Ranch

near Arnett. It had scarcely rained for three years and from fields that had once been plowed the surface soil and the very seed was blown into neighboring counties.

The Davison Ranch itself however is largely covered with tinu oaks which the natives call shinnery. Here in the dust covered shinnery we were to study the lesser prairie chickens photograph their curious courtship antics, and record their gobbling calls.

The cattle eyed us curiously when we first erected one of our observatories on blinds near the home of a burrowing owl. This blind was made of artificial grass mats greener than anything in that whole country greener than anything the heifers had ever seen. Instinctively they came lumbering in from all quarters to get a luscious meal.

The effect of habit on these same heifers was even more amusing after their first severe rain storm. The downpour not only



SOME 20,000 SNOWY HERONS SEEK THE PROTECTION OF MCILHENNY'S "BIRD CITY"

In this celebrated rookery at Avery Island, Louisiana, the microphone was set up near several of the nests to record the neighborhood gossip. The talk was far from musical.



Photograph by James Tanner

THE BELLOW OF THE ALLIGATOR WAS SUCCESSFULLY RECORDED

When the reptile bellows, the horny plates on its back vibrate, causing the water to dance and shoot spray two feet above the surface. Air sacs resembling those of a huge leopard frog can be seen at the sides of the neck. Through the courtesy of F. A. McIlhenny, the fearsome performance which serves the same function as a bird's song, was caught by camera and microphone (page 709).



Photograph by P. P. Kellogg

DR. ALLEN SPIES ON IVORYBILLS AND RECORDS THEIR ANTICS

For five days the members of the expedition made continuous observations through a pair of powerful binoculars (pages 717 and 713). The camp at the base of this large oak was surrounded by water and palmetto fans kept the blankets out of the mud (page 706).

laid the dust but filled every depression in the ground with water, including those trodden by the cattle themselves around the drinking vats that were normally kept filled by windmills. Never before had they seen standing water except in these vats and never had they drunk out of anything else. So now with the vats in the center of large ponds they could be seen wading out to them to get a drink.

Each morning and again at evening during the spring on the Davison Ranch the lesser prairie chicken cocks assemble in groups of from four to forty on certain flat topped knolls in the shinnery to compete with one another in a show of prowess both of voice and of bodily vigor (page 701).

For six weeks the males engage in these matches before the females intentionally visit their gobbling grounds. Each male comes back to exactly the same spot each morning and gradually forces upon his neighbors a respect for his territory some 25 or 30 feet square.

Many of the combats are mere gestures or feints of anger but others are sufficiently severe to scatter feathers over the shinnery.

Sometimes when the males jump at one another and strike with their wings a hapless bird is flipped clear over onto his back by a stronger rival.

Each morning from April 25 to May 2 found us at the gobbling grounds of a group of 26 males with the microphone staked out in the territory of some aggressive cock. Seven of the eight mornings the wind howled in the microphone and the dust blew but at last it was quiet and we secured a nearly perfect recording of the birds' sounds, from the pattering of their feet and the silken twitching of their tail feathers to the loud gobbling that follows.

COCKS ARE HEARD TWO MILES AWAY

This gobbling is accompanied by the swelling of the little balloons on the sides of their necks which serve as resonators. These air sacs really dilations of the esophagus swell up to the size of hens' eggs when the mouth and nostrils are closed and air is forced into them from the lungs.

The sound itself is produced by the vibration of tiny membranes in the syrinx, or voice box at the lower end of the wind



AN IVORY-BILLED WOODPECKER LEAVES HOME AND HIS MATE TAKES
HER TURN ON THE EGGS

The birds work in two hour shifts during the day but the female leaves her partner on duty all night—so that she always knows where he is says the author. The nest hole was 43 feet up in a dead swamp maple and measured $4\frac{1}{4}$ inches in diameter. The great amount of white in the wings distinguishes this bird from the commoner pileated woodpecker.

pipe. Such resonance is given to the sound by the neck sacs that the birds can be heard for two miles on a quiet morning.

The strong winds made sound recording very difficult in western Oklahoma though such clarion calls as those of the western meadowlark and the whip-whirr of the burrowing owls at dusk came through very distinctly. We failed to record however the white-necked ravens and Mississippi kites which while rare in many parts of the range are fairly common on the Davison Ranch.

From Oklahoma our expedition moved north and west through the barren wind-swept prairies of western Kansas into the verdant irrigated stretches of eastern Colorado, and thence to Colorado Springs and Denver.

Here we were met and generously assisted by Mr. Robert Niedrach, Curator of Birds at the Colorado Museum of Natural History. Director J. D. Figgins kindly relieved him of other duties so he could help us in our efforts to record and film the golden eagles and prairie falcons which are still not uncommon in the vicinity of Denver.

Never shall I forget the experience of lying prone for four hours on a flat rock at the edge of Box Elder Canyon a few miles north of Fort Collins.

Watching and waiting for a golden eagle to return to its eyrie.

Directly below me the cliff fell away 750 feet while the nesting ledge was only 60 feet down. I was covered with one of our grass blinds so that the eagle would not see me and unknown to me until I tried to shift my position the boys had piled so many rocks on the edge of the blind to keep me from falling off the cliff that I could not even roll over.

At last the majestic bird sailed in with a jack rabbit in his talons and the young

eagles screamed with anticipation at his approach. The picture impressed upon my mind was well worth all the fatigue of the journey up the mountain and the long wait on the hard rock at the edge of the canyon.

EAVESDROPPING AT AN EAGLE'S NEST

A few days later Bob Niedrach led us to another eagle's nest in Willow Tree Canyon near Denver where we could actually drive the sound truck almost to the cliff's edge.

We padded the microphone lest it strike a rock and let it down about 60 feet on its cable to the nesting ledge. Then concealing the trucks in a grove of pines near by, we spent the night on the bunks within them.

The next morning at daybreak we clamped on the earphones to learn what was happening at the nest which of course we could not see. It was interesting to hear the many species of birds in the canyon below greet the new day with their various twitterings, screechings or carols.

There was a canyon wren too far away to record whose song a series of rich descending whistles came through beautifully. A red-shafted flicker called close at hand. A black-headed grosbeak and a western tanager with song almost exactly like our eastern re-breasts and scarlet tan-



IVORY-BILLS CHANGE PLACES—THE FIRST PHOTOGRAPH EVER TAKEN OF A NESTING PAIR

The ivory-billed woodpecker is now, perhaps the rarest North American bird and from time to time has been thought extinct though it formerly was found locally throughout the Gulf States and as far north in the Mississippi Valley as southern Indiana. The species is about the size of a crow and the male has a flaming red crest that of the female being black.

gers could be heard faintly up the canyon. A long-crested jay screeched and a flock of violet-green swallows and white-throated swifts came forth from the crannies in the rocks and twittered past the microphone.

About 7:30 a loud crackling in the 'mike told us that the eaglets had arisen and were doing their daily dozen—jumping up and down on the nest and fanning their wings.

About 8 o'clock they began to scream and looking out of the truck window we could see one of the parent birds coming,



FRANKLIN'S GULLS AND WHITE FACED GLOSSY IBISSES NEST TOGETHER

These two species join forces in large colonies in the tules of the Bear River Marshes, Utah. Apparently they do so from force of circumstances rather than sociability for the expedient learned by watching from blinds that they pass most of their time fighting. An excellent flyer the white-faced glossy ibis (night) travels miles for a meal of crustaceans, earthworms, water insects or frogs. Franklin's gull nests in marshes and is seen on United States coasts only in winter.

out of the east. In majestic circles it sailed over the canyon, looking the ground over to make sure that all was safe. From its talons dangled a large jack rabbit.

Now the screams of the hungry eaglets became more and more excited as in narrowing circles the old bird dropped lower and lower. Finally in one long graceful sweep it disappeared below the rim of the canyon and a moment later we heard the crash of twigs as it landed on the nest. There were no cries from the old bird. Silently she came and silently she left. Only the calls of the young were recorded.

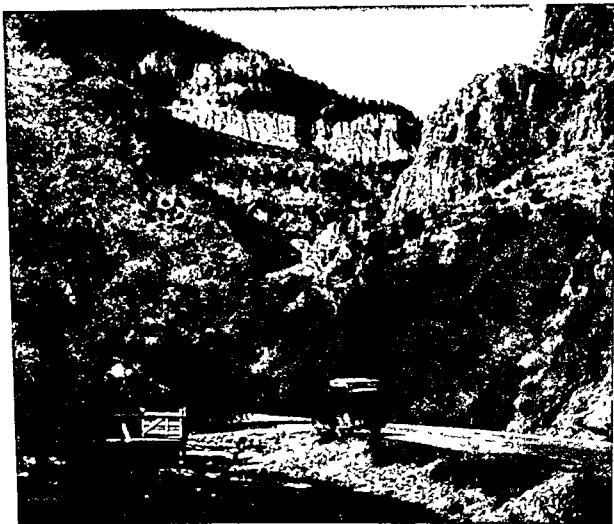
A more obliging creature was the dashing prairie falcon that had its eyrie on a similar vertical cliff at the mouth of a canyon near Denver. Its wild scream, whenever we approached the cliff, made it easy to re-

cord and the photographing was not difficult.*

At the bottom of the same precipice under an overhanging cliff, long ages ago the home of cliff dwellers, a little canyon wren had built its nest and the resounding whistles of the male were clearly recorded when once we discovered his favorite song perch on a near-by rock.

One of the most appealing experiences of the trip was at the home of a mountain plover in the arid prairie country east of Denver. It was one of those uncertain days when one can count a half-dozen rain storms in different directions while the sun shines brightly overhead. Eventually one

* See "Week-ends with the Prairie Falcon" by Frederick Hall Fowler, NATIONAL GEOGRAPHIC MAGAZINE, May 1933.



LOVELY LOGAN CANYON IS A HAPPY HOME FOR THE WATER OUZEL

There were plenty of these birds along this mountain torrent and they were not difficult to photograph, but the rush of the turbulent current over the rocks made so much noise that ordinary methods of recording their song were impossible. The microphone was therefore removed from its parabolic reflector and fastened to a rock at the edge of the stream where one little musician sang at daybreak for posterity (page 716).

of the storms headed directly for us, and soon we were being pelted with hailstones larger than marbles.

There was no shelter anywhere on the prairie and as we hastened into the truck we noticed the alarm of the birds about us when the hailstones struck around them. We drove the truck to within eight inches of the plover's nest to protect the eggs, and immediately the bird returned to the nest (page 720).

HOW A MEADOWLARK GAVE THANKS

Then birds started flying to us from all directions, especially the showy lark buntings, and soon there were some twenty of them sitting beneath the truck.

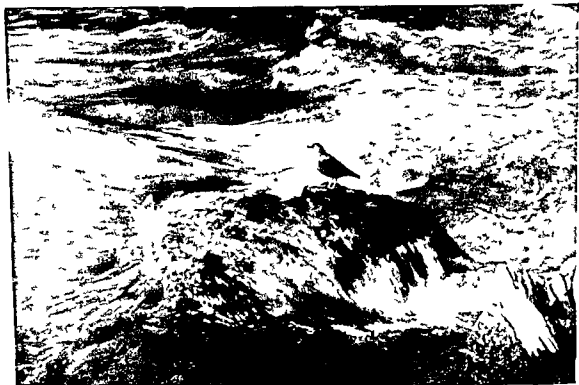
Then came a western meadowlark, pitifully frightened. He longed for the shelter

of the truck, but he was a timid bird and each time he approached within ten feet of the car, and could see us inside, his courage deserted him and he ran back. Three or four times he advanced as hailstones hit around him, but just as often he retreated.

At last, summoning all his courage, he made a rush for the car and slipped safely beneath with the other birds. And when he found himself secure at last, he loosed his feelings in one of those clear, beautiful songs that endear this bird to all westerners.

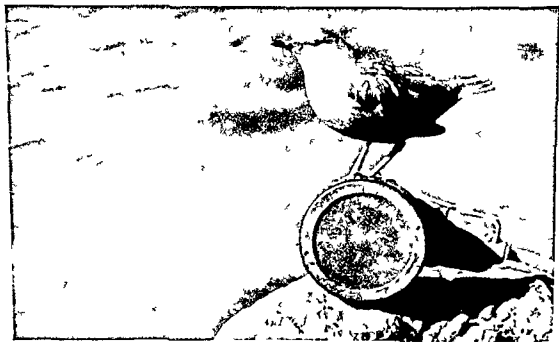
From just a few inches under our feet his carol of thanks burst through the car and for a moment turned our thoughts to those countless natural dangers which constantly beset all wild creatures and to which we so seldom give heed.

Northward and then westward through



IN DASHING ROCKY MOUNTAIN STREAMS THE WATER OUZEL IS AT HOME

It gets a large part of its food from aquatic insects which it captures by diving into the turbulent water and walking along the bottom



A SPIRIT OF THE SPRAY MADE MELODY IN LOGAN CANYON

With the microphone on the rock from which the water ouzel or dipper sang at daybreak, the bird's voice was caught in spite of the rushing water for the singer's bill was often less than two inches from the diaphragm. Sometimes the performer mounted to the instrument itself but then its little claws made scratching sounds that ruined the recording.

and Wyoming, the expedition wound over the mountains to Logan Utah where I was scheduled to give a course of lectures in ornithology at the Utah State Agricultural College.

We traveled through the beautiful Logan Canyon where we had our first opportunity to get really acquainted with the dippers or water ouzels which live along most of the dishing Rocky Mountain streams. I tried for its mockingbirdlike song which is often heard in midwinter; the dipper presents a difficult problem for the microphone because with normal amplification the noise of the stream drowns out all other sounds.

Hence we studied intently a pair that had built their mossy nest on the side of a huge boulder to determine some method of capturing the song amid the rushing water. We often saw the little bird plunge headfirst into the whirling stream using its wings as flippers and running along on the bottom in search of May fly and stone fly larvae. The mountain torrent held no terrors and the bird's dense plumage shed water like a duck's.

NO MIKE FRIGHT HERE

The song season was nearly over but we soon discovered that this little dipper had a favorite rock from which early in the morning it sang before going in search of food for its young.

It was a simple matter the next morning to fasten the microphone to the rock and have the bird's bill within two inches of the diaphragm while it was singing. Indeed at times it mounted to the microphone itself to sing but then the scratching of its tiny claws ruined the recording (opposite page).

In the beautiful Cache Valley of Utah into which Logan Canyon empties we found many fascinating birds and during our two weeks stay added 15 species to our already long list of records. Birds like the long billed curlew the black necked stilt the western willet and the avocet which we think of as very rare in the East are truly common there (pages 718-719).

Even on the campus of Utah State Agricultural College the lovely lazuli buntings lark sparrows Cassin's purple finches and black headed grosbeaks made bird observing a real pleasure.

Our normal method of recording at day break however was completely upset for

with the setting of the sun there poured down the canyons from the snow peaks above a strong cooling breeze that continued until 6 o'clock the next morning. This was no doubt as delightful to the sleepers as it was annoying and frustrating to our recordings. It proved a blessing in disguise however to some of the party for Kellogg and Tanner could sleep that much longer while I continued to arise at 4:30 to lead my class of students afield to observe the birds.

Many afternoons we drove to the Bear River Marshes about 22 miles southwest of Logan and enjoyed the innumerable waterfowl that had congregated there: ducks by the thousand, Franklins gulls, Brewster's greets, white faced glossy ibises, western and eared grebes and others too numerous to mention and certainly too numerous to photograph satisfactorily in the short time at our disposal (page 714).

Several pairs of snowy plovers had laid their eggs in the middle of a gravel road leading into the marsh from Brigham and would dash off their nests just long enough to let each car pass over and roll by. There were literally scores of these interruptions daily but the birds continued to live in the middle of the road (page 720).

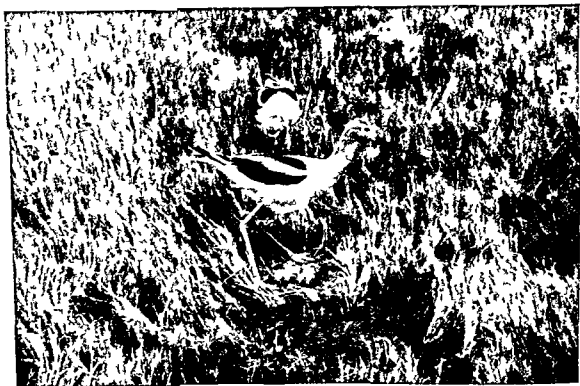
The last week of June found us headed northward toward eastern Idaho to look for trumpeter swans. It is thought that only about 75 individuals of this species remain alive in all the United States though at one time it was not an uncommon bird throughout the West.

Arriving at Henrys Lake we scanned its surface with our binoculars and discovered a pair of these birds swimming near a submerged island in the middle of the lake. Finding very comfortable quarters at the Bar L Ranch close by, we decided to stop for a few days.

TRUMPETER SWANS REFUSE TO TRUMPET

Next morning we surveyed the lake more closely and found that there were 19 swans staying there, one of which had already molted its wing feathers and was unable to fly. None of the birds was nesting however even the mated pair in the center of the lake having been discouraged by the changing water level for the lake was being used for water storage by a power company.

We were hopeful that some of the flock might fly around and do some trumpeting.



AMERICAN AVOCETS TAKE TURNS SITTING ON THE NEST

In this case the female was more timid than the male and after the observation blind was installed near by she always waited for the male to take his position over the eggs before offering to do her share of the home duties.



MRS. AVOCET BUNTS HER MATE FROM THE NEST

When the female finally made up her mind all was safe she had difficulty dodging her mate from the eggs. Once in possession, she did not settle immediately but fidgeted for several minutes, disturbed by the sound of the motion-picture camera.



AN AMERICAN AVOCET MAKES CAREFUL PREPARATIONS BEFORE COVERING ITS EGGS

They are so large compared to the size of the brooder's body that it is difficult to cover all four of them. Before settling upon the eggs the bird usually turns them with its bill and adjusts them so that the small ends are toward the center like wedges of a cut pie.



IN INCUBATING THE AMERICAN AVOCET MUST BE A CONTORTIONIST

The long legs are folded and straddle the nest. When feeding avocets use the curious upturned bill like a scythe. Flat at the tip and as thin as a knife blade it is swung from side to side to gather marsh flies and their larvae from soft mud or from the surface film of shallow water.



A STONY HIGHWAY OFFERS A NESTING PLACE FOR THIS SNOWY PLOVER

The little bird laid its protectively colored eggs in the middle of a gravel road leading out to the Bear River Marshes. It soon became accustomed to passing car and would dart from its eggs just in time not to be run over, then would scamper back as soon as the car raced by (page 717)



NOT EVEN AN AUTOMOBILE COULD FRIGHTEN THIS MOUNTAIN PLOVER

The species was formerly fairly common along the eastern edge of the Rocky Mountains, but has become rare because of extensive shooting. Shortly after the photograph was taken near Denver a sudden hail storm threatened to kill the birds and to prevent the party doing the truck work. Dozens of eggs were taken by the collector (page 15)

which we might record so we stayed for three days and kept our microphone and sound mirror ever ready. But it was not to be so simple and we were doomed to disappointment.

Thereupon we moved on to Lower Red Rock Lake, Montana, a few miles to the westward where we were informed a pair of swans had reared young the year before. This lake is about four miles long and three miles wide and is dotted with innumerable marshy islands.

At first we could see no signs of swans. But climbing to the roof of the Montana Gun Club with our powerful binoculars we soon located seven birds, two pairs of which seemed to be nesting.

A cruise around the lake in a duckboat showed that both had nests though one was empty, the other contained two infertile eggs and the broken shells of two others from which the cygnets had hatched and been led away by their parents.

We were now quite hopeful of being able to secure a record of the voice of the trumpeter swan though we could not get the sound truck within a half mile of the nearest pair. For four days we remained at the Montana Gun Club with the microphone ready, but except for one trumpet call during the night we heard nothing from the



Photograph by P. P. Kellogg

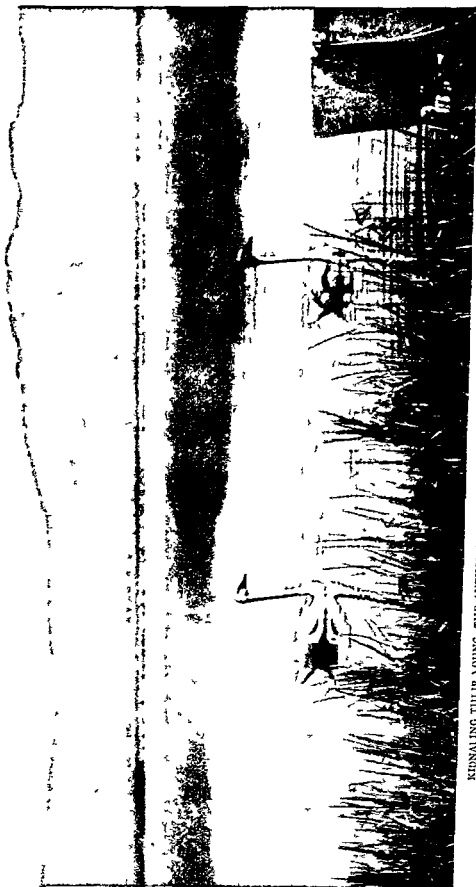
HERE IS THE HOME OF ONE OF AMERICA'S RAREST BIRDS—THE TRUMPETER SWAN

Dr. Allen discovered it about 15 feet from the open water of Lower Red Rock Lake, Montana, on one of the marshy islands which dot its surface. The nest was about six feet across and two feet high.

swans. Our time was almost exhausted and still we had failed to catch the voice.

TRUMPETERS TRICKED

When the last morning was at hand we staked our all on one last scheme. We concealed the sound truck behind one of the buildings and ran the cable to the edge of the lake where we set up the sound reflector and the blind with the Kielev camera inside. Then we made a little cylinder of fly screening and set it among the rushes, fastening a string to the top of it and running it over to the blind.



KIDNAPING THEIR YOUNG, THE AUTHOR THICKLY WARY TRUMPETER SWANS INTO TALKING FOR THE 'MILK

For five days the birds were patiently stalked without a close up or a sound record of their voices. But ten minutes after the little cygnets were imprisoned in the screen cylinder the two of them were all led up close to the cage where they began talking to their children. When Dr. Allen released the young swans there was a great family reunion in the air. The mother began to talk to her children as well as the young, trumpeting of the parents. Thought once to be almost extinct, these, largest of North American wild birds are now increasing in numbers under protection. There are at least 75 in the Yellowstone region and 1 more in British Columbia.

Leaving Kellogg ready in the sound truck, Tanner and I then rowed two duck-boats to the opposite end of the lake. We followed devious channels so as to avoid the swans until we could start drifting slowly toward them from the opposite side.

Swans are wary creatures and these kept moving away from us, with the cygnets between them. But so slowly did we approach that they had time to feed as they went, and little did they realize that we had cut off their avenues of escape, except the one that lay past the blind. Never realizing, they fell into this simple trap and within two hours had moved to the far side of the blind.

Now we increased our speed and rowed in more quickly than the cygnets could swim, cutting them off from their parents and edging them over to the blind. With the two boats this was easily done, and in a few moments we had picked them up and placed them inside the cylinder of screening.

We now rowed quickly back into the lake, and while Tanner diverted the attention of the old birds, I went ashore and sneaked into the blind. Jim then disappeared up the lake.

Within ten minutes the swans had found their youngsters and were talking to them—into the waiting microphone. In a few minutes we had the sounds of both young and old safely recorded. I then pulled gently on the string, capsizing the cylinder and releasing the young without their knowing just what had happened and without their realizing that we were anywhere around (opposite page).

The little cygnets swam from one parent

to the other, talking back and forth and gradually moving up the lake again. They were none the worse for having been our prisoners for a few minutes so that we could make a permanent record of their voices that will go down through the years, even though all their kind should vanish from the earth.

EXPEDITION'S SWAN SONG

This was in very truth our swan song, though a happy one, and the end of our expedition. We had exposed ten miles of film, we had recorded the songs and calls of 100 species of birds, including the rarest in North America. We had filmed the home life of nearly as many and had filled our journals with observations that may help in the preservation of vanishing species.

We now had six days for the return journey, two of these we spent in Yellowstone National Park where we filmed Townsend's solitaire and Williamson's sapsucker, and secured recordings of the Lincoln's sparrow, Audubon's warbler, and Clark's nutcracker. Unfortunately, the solitaire, though nesting, had stopped singing, and our failure to record this beautiful song was one of the disappointments of the trip.

By driving night and day and resting only while a broken axle was repaired, we arrived safely at Ithaca just ahead of the greatest flood in the history of central New York. Two hours after we pulled in, the deluge broke and ten inches of rain fell in the next few hours. The hillside road leading to my home was entirely washed out, so that after a successful journey of 15,000 miles, our trucks finally became marooned in my own backyard.

THE SOCIETY'S NEW 'BOOK OF BIRDS' IS READY

The National Geographic Society invites attention of members to its new "Book of Birds," in two volumes, edited by Gilbert Grosvenor and Alexander Wetmore—the first work ever published portraying with comprehensive detail, and with full color illustrations, all major species of birds on the North American Continent north of Mexico. Full color portraits of 1,000 birds by Major Allan Brooks, more than 230 monochrome photographs and bird migration maps, 633 "bird biographies," and many fascinating articles by outstanding authorities—T. Gilbert Pearson, Arthur A. Allen, Robert Cushman Murphy, Frederick C. Lincoln, Francis H. Herrick, Alexander Wetmore, etc.—are contained in this 704 page work.

Because these volumes are published by The Society as a contribution to the increase and diffusion of geographic knowledge, and because the first cost of the engravings has been assumed by THE NATIONAL GEOGRAPHIC MAGAZINE, "The Book of Birds" may be purchased at a price of \$5.00 the set, postpaid in the United States and possessions, elsewhere 50 cents additional. It is obtainable only from The Society's headquarters Washington, D. C.



Photograph by Hugo Böhme

THE MIGHTY CATHEDRAL OF MEXICO RISES WHERE AZTECS WORSHIPED PAGAN GODS

Carved idols and other Indian relics are reputed to form part of the foundation of this historic mother church of New Spain. The first Christian house of worship in the city was erected here about five years after the Conquest. The present Cathedral dates from 1667. Adjoining it (right) is the Sagrario, a smaller church. In front is the vast Plaza de la Constitución, or Zócalo, seen through an arch of the Municipal Palace. Though often called Mexico City, the capital officially is México D. F. (Federal District).

IN THE EMPIRE OF THE AZTECS

Mexico City is Rich in Relics of a People Who Practiced Human Sacrifice, Yet Loved Flowers, Education, and Art

By FRANK H H ROBERTS, JR

Smithsonian Institution

MEXICO City's magnificent Cathedral richly adorned Sagrario and extensive National Palace greatly impress the present day visitor as he stands and gazes across the Zocalo, or Great Square for the first time

But suppose the scene should fade away and be replaced by that which greeted Cortez and his followers in 1519. The modern traveler would be as enchanted by the barbaric splendor before his eyes as were the Spaniards and, like Bernal Diaz del Castillo soldier chronicler of the Conquest, he might well be moved to ask, Are not these things a dream? For the civic center of Mexico City was once the Tecpan, or Temple enclosure of Tenochtitlan, the Aztec capital.

Where the Cathedral and Sagrario now stand rose the great pyramid topped by its temples to the Gods of War (Color Plate I) and of Rain. The National Palace occupies the site of Montezuma's palace (page 728). In the plaza stood the massive circular stone used for sacrificial combat (Plate II).

SKULL RACK HELD SACRIFICIAL HEADS

Behind the stone rose the temple to the God of the Air, and not far distant was the sinister mass of the skull rack where were placed the heads of victims offered to the gods (Plate III). In front of this stood a devotional altar for worship and near by was a pool of water for ceremonial observances.

Numerous other temples were scattered about the enclosure. There were houses occupied by the priests, palaces for officials, even a zoo and an aviary.

Brilliantly colored costumes of the people contrasted with the white of the pyramids and other structures, completing the picture and making an unforgettable impression upon those who beheld the scene.

Other parts of the metropolis suggest similar contrasts for this capital city of early Aztecs and modern Mexicans is a veritable storehouse of New World history.

On all sides the eye is met by remnants of ancient glories side by side with 20th century splendors.*

There are places where only a few short steps separate the finest of aboriginal art from the ultramodern murals of Diego Rivera. Sixteenth century buildings adjoin apartment houses of the latest style. Smiling faces of natives thronging the streets bear the stamp of Aztec lineage.

Ancient industries are reflected in today's gold, wood and featherwork, and architectural ornamentation on newly rising structures exhibits the influence of Aztec design and symbol. It is this pleasing blend of old and new that gives the city its unique charm and individual character.

AZTEC HISTORY TOLD IN PICTURES

The story of the Aztecs is much better known than that of many New World peoples. There are native manuscripts called codices, detailing in pictographic form certain phases of their history (pages 730, 731, 733, 746 and 747). Descriptions of the city and accounts of the life and customs of its inhabitants were written by some of the Conquistadores and by several of the priests who accompanied them.

Besides the pictographic stories which supplement the Spanish records, helpful narratives were penned by a few native scholars taught to write by their conquerors.

Added to these documents is the evidence still being obtained from extensive archaeological and historical researches by experts of the Mexican Government and by other investigators from both America and Europe.

Practically every excavation for new construction work in the city yields its quota of Aztec relics and adds material to the extensive collections in Mexico's National Museum of Archeology, History and Ethnology. An excellent example of a chance

* See *North America's Oldest Metropolis* by Frederick Simpich in *THE NATIONAL GEOGRAPHIC MAGAZINE* for July 1930.

find of this nature is the statue of Coatlicue the Earth Goddess who wears a skirt of woven snakes. This awesome figure is one of the striking exhibits now on display in the museum.

The foundation of the Aztec nation and its subsequent florescence occurred at a time when the Old World was sunk in the depths of the Middle Ages.

Entering the Valley of Mexico early in the 14th century as a crude hunting people the Aztecs found various communities around the borders of a great lake and came into contact with a culture which was very high.

According to some accounts they settled near Chapultepec and came under the influence of the Acolhuacans from whom they received many cultural traits. Between about 1367 and 1376 the Acolhuacans drove them out and forced them to take refuge on two small reed covered mud banks or islands in the center of the lake.

The settlements on the islands grew into two towns Tenochtitlan and Tlatelolco. They appear to have risen side by side and progressed as independent units for more than a century, although the space between them was reduced to little more than a broad canal. Late in the 15th century Tlatelolco was conquered by the sixth ruler of Tenochtitlan and the two were united to form one great city.

ORIGIN OF MEXICO'S COAT OF ARMS

The legendary explanation for the choice of the present site of the city is not in full agreement with the historical facts but is more picturesque. According to tradition the Aztecs were told that when they saw an eagle eating a serpent there they should stop and found their dynasty.

Upon reaching the borders of a large lake they saw a beautiful island and the priest who led them beheld a huge eagle with a struggling snake in its talons. The bird came to rest on a cactus plant and proceeded to kill and devour the reptile. The Aztecs were overjoyed at this because their prophecy was fulfilled and they set about establishing their city.

The tradition is symbolized today by the eagle serpent and cactus in the Mexican coat of arms and flag.*

As long as the Aztecs were weak and hemmed in by their foes they subsisted on

fish birds aquatic plants and such vegetables as they were able to grow on floating gardens or *chinampas*. The latter were formed by heaping up soft mud from the lake on rafts made from reeds and wattle work.

These floating islands gradually increased in size. The interlacing roots of the plants made them more compact and eventually anchored them to the bottom of the lake. More and more were built and as their number increased they became a series of rectangular plots separated by canals just wide enough for the passage of canoes.

The gardens of Xochimilco not far from Mexico City are a present day illustration of this type of made land and communicating waterways (opposite page).

By the time of the Conquest Tenochtitlan was a veritable New World Venice in fact one of the Spaniards with Cortez and the conqueror himself, called it that.

One of the soldiers in his journal describes it as a place of many wide and handsome streets formed half of hard earth like a brick pavement and half of canal so that the people moved about either by land or by water (Color Plate VII).

Many of the boulevards were entirely of water however, and could be traversed only by boats. The position and direction of a number of the more important streets of modern Mexico City were determined by the course of these main canals and as one walks along them today he travels on pavement where the Aztec went in his canoe.

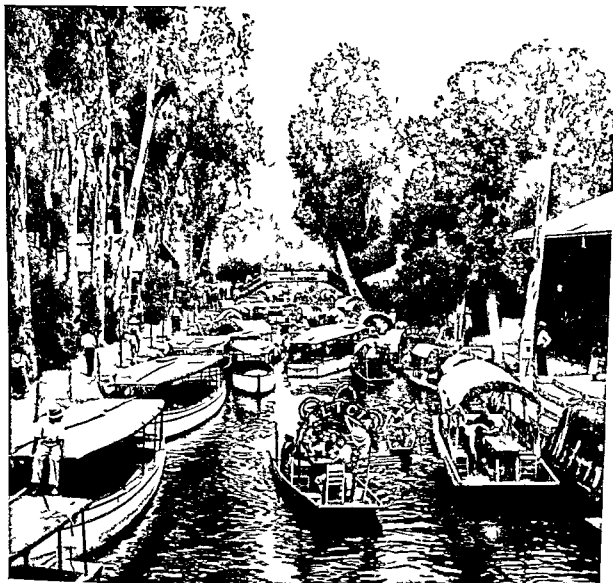
A POWERFUL EMPIRE IS BORN

The Aztecs did not become a real power in the Valley until their fourth ruler Itzcoatl 1427-1440 became head of the kingdom. Itzcoatl had a famous general named Mexitli who conquered many neighboring cities and tribes and exacted from these subject peoples tribute which enriched the Aztecs.

From this time on under five succeeding rulers Tenochtitlan prospered and expanded until by the time of the Conquest tribute was pouring into the coffers of Montezuma II from all of southern Mexico the Vera Cruz coastal plain and even from Guatemala.

Agriculture was important and while many vegetables were raised in the environs of the city most of the products came from surrounding precincts. A variety of maize or Indian corn was developed which ma-

* See *Flags of the World* in the NATIONAL GEOGRAPHIC MAGAZINE, September 1934.



The photograph by F. J. H. I. ng

BOATLOADS OF HOLIDAYMAKERS JAM THE CANAL LEADING TO THE FLOATING
GARDENS OF XOCHIMILCO

Indians pole the flat-bottomed craft with awnings and fancy names through the eucalyptus-shaded Canal de la Viga. Since the days of the Aztecs the floating gardens of this Mexican Venice have been a source of fresh vegetables and flowers as well as a favorite resort for throngs from the capital. The gardens were originally large rafts of interlaced twigs covered with soil. Huts were erected on them and the gardener could row his farm from place to place. Later the plants took root in the lake and the gardens no longer floated freely.

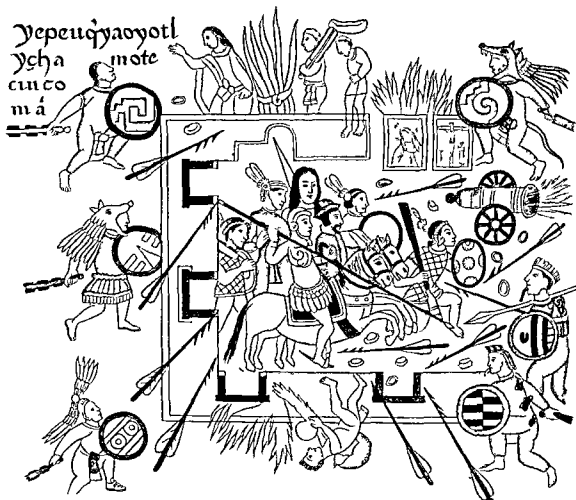
tured rapidly an essential quality for the high arid plateau country. Other products were sweet potatoes, tomatoes, squash, beans, peppers, cacao or chocolate, tobacco, cotton, hemp, rubber, and copal.

The turkey was an important domesticated fowl and an item of barter (Color Plate IV).

The gold and silversmith's art was highly developed. There were numerous woodcarvers, workers in stone, makers of elaborate turquoise mosaics, and producers of featherwork.

Other groups spun thread from cotton and wove it into cloth; the tailors fashioned it into garments. Still others made the elaborate headdresses worn by officials and warriors. There were sandal makers, basket weavers, pottery makers, and tanners of skins. Merchants too constituted a busy and important group.

Clothing varied to conform to both the position or rank of the wearer and the occasion on which it was worn. The ordinary dress of an Aztec man consisted of a breech cloth, a hip-cloth, a mantle or cape, and



HOW AZTECS BESIEGED CORTEZ IS SHOWN BY AN INDIAN ARTIST OF THE TIME

The Spanish invaders had been permitted peaceably to enter the Aztec capital (Tenochtitlan) in 1519 and had been assigned a palace. Shortly afterward when they kidnaped Montezuma the ruler and massacred unarmed citizens dancing at a festival the Aztecs rose and attacked the garrison as depicted here. In the courtyard bearded Cortez and long haired Marina his Indian mistress and interpreter with a mounted aide and four Indian allies defend themselves behind a cannon. A chapel with a Virgin and Calvary (upper right) is set on fire by the attackers. On the roof (upper left) Montezuma begs his people to let the Spaniards depart in peace. Angered they fatally wound their sovereign with a stone shown flying toward him. These illustrations reproduce a native pictorial record intended to honor the Tlaxcalan Indians who aided Cortez (pages 731 733 746 and 747)

sandals. The mantles and ends of the breech cloth were short and plain for the lower classes and long and highly embroidered for those of more important station (Color Plate V).

Women's dress consisted of a short skirt and sleeveless blouse the elaborateness of which likewise depended on the wearer's position in the social scale.

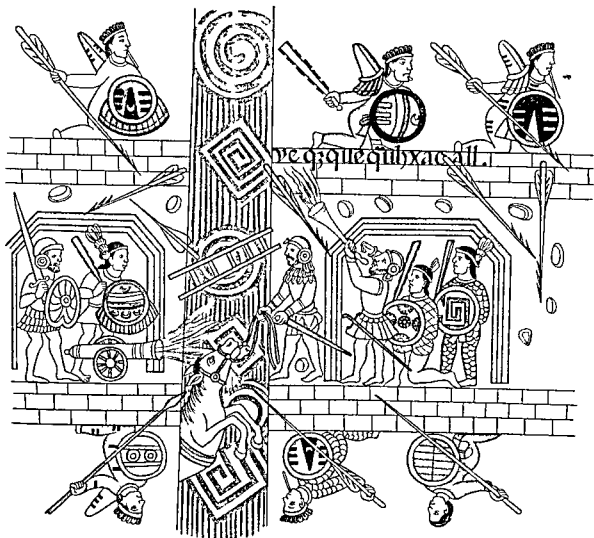
ARMOR OF COTTON AND FEATHERS

Warriors generally wore armor made from quilted cotton, three-fourths to an inch and a half thick, soaked in brine (Plate I).

Sometimes the legs also were encased in quilted armor and the outside of the entire suit was frequently covered with feathers, plates of gold or of silver. The feathers played an important part in that they formed an elastic liver on the outside of the quilted cotton and made it even more effective protection (Color Plate II).

The protection offered by such apparel was so effective against arrows and javelins that the Spaniards adopted and wore it.

The use of feathers also made possible a differentiation of costume that indicated various subdivisions and companies in the



WITH CRUDE TANKS, CORTEZ TRIES TO FIGHT HIS WAY THROUGH MEXICO CITY

In a vain effort to get control of strategic bridges so that they could retreat from the capital the Spaniards built portable wooden shelters for protection against the stones and javelins hurled by Mexicans from the housetops. A Spanish soldier with sword and shield fires a cannon beside a Tlaxcalan ally in the tank at the left. On the right one of Cortez's men discharges a harquebus through a loophole while another tries to rescue his horse from the conventionalized canal (left center) into which it has fallen. The ladder represents an attempt to bridge the canal which has stopped the advance of the tanks. Native artists who survived the Conquest painted these pictures. The original record called the Lienzo de Tlaxcala was long kept in the city hall at Tlaxcala but disappeared during Maximilian's reign; the reproductions are made from an exact copy published by the Mexican Government in 1892.

military forces. Some uniforms had white and red feathers; others blue and yellow; some were green and others simulated actual birds.

Some groups wore animal skins over their armor or painted it to resemble animals. Warriors of merit wore headdresses half mask, half helmet, many of which imitated the heads of jaguars, mountain lions, wolves, snakes, birds, and other creatures. The warriors in the sacrificial combat scene (Plate II) are wearing headdresses symbolic of the Eagle and Jaguar. The priest in charge is dressed as a bear with a casque

representing the head of that animal.

The principal leaders and war chiefs were distinguished by the cut of their hair, by lip and nose plugs, by their wide and flowing mantles, and by towering plumes of green feathers (Plate VII). Shields were ornamented with designs which indicated war honors, the number of persons captured, or exploits of extreme bravery. The village chiefs wore a white mantle and ambassadors (Plate VII) carried a fan.

The ordinary dress of the priests was black, even their bodies were stained black. But the color of the sacrificial priest was



Photograph by Lu's Varden

HEROIC INCIDENTS IN THE LIFE OF MEXICO'S LAST AZTEC RULER ARE DEPICTED ON THE BASE OF HIS STATUE

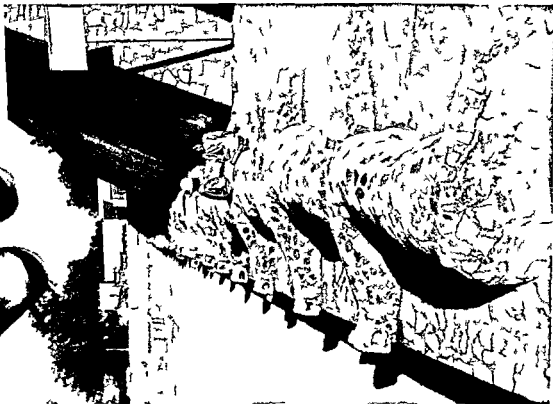
Cuauhtemoc's plumed figure in bronze stands atop this impressive monument. The bronze figures guard a flight of steps at each side of the base, which is adorned with massive tablets. The relief on this side shows Cortez's soldiers torturing the successor of the Montezumas and one of his chiefs with fire in a vain attempt to force them to tell where the Aztec gold was hidden. A warrior dressed in a jaguar skin (third figure from right) stands in tense anguish as he watches his brave master suffer. The Spanish later hanged Cuauhtemoc.



Photographs by Luis Nolasco

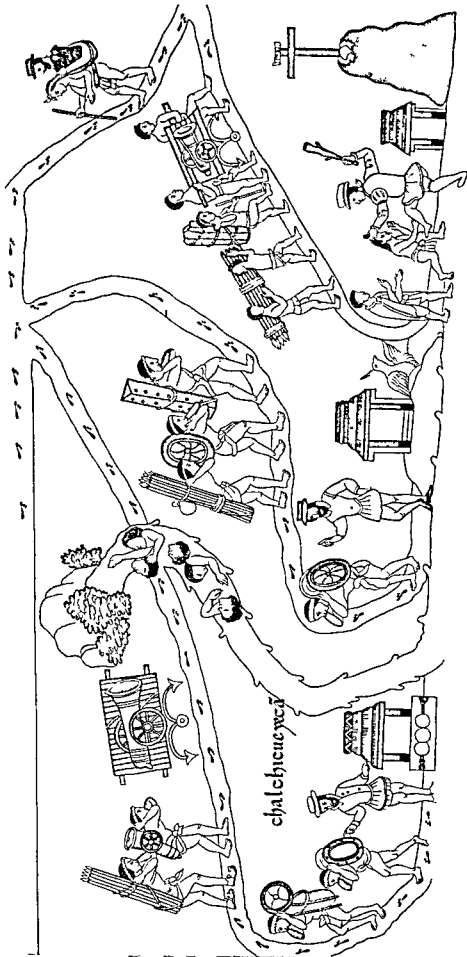
THIS TREE IS A DRAMATIC LINK WITH THE CONQUEST

Under the giant ahuehuate in the suburb of Popotla Cortez is said to have stopped and wept as he watched the bleeding remnants of his army fleeing from the city after the horrible defeat by the Aztecs during the 'Noche Triste' or 'Sad Night' of July 2, 1520. An iron railing reputedly forged from the trunks of tortured and dying Indians protects the tree.



YOUNG MEXICANS PLAY ON ONCE SACRED STONE SERPENTS

In Aztec times countless sacrificial victims were led up the broad steps of the Pyramid of Tenayuca, the restored base of which appears at the right. One of the last preserved of Aztec relics, it stands near Tlanepantla about six miles north of the Mexican capital. Tenayuca, in the Aztec tongue means 'Where They Entered Walls'.



A 16TH CENTURY INDIAN "COMIC STRIP" SHOWS HOW CORTÉZ RECEIVED BADLY NEEDED REINFORCEMENTS

Escaping from the Aztec capital with a remnant of his followers the Conqueror retreated to the domain of his allies, the Tlaxcalans. There he sent to Spanish settlements on the coast for more men and supplies. In this painting a Spaniard (left) dispatches Indian porters bearing harness, wheels, lances and anchors for gunboats. On the way some of the natives drown in a stream (upper center). Military equipment is also sent from two other places (lower center and right). Near the cross denoting the town of Villa Rica de la Vera Cruz a Spaniard chastises a rebellious Indian while high up on a trail a bearded soldier rides pickaback across the mountains. These reinforcements enabled Cortéz once more to attack Mexico City (page 746).

red. On the occasion of certain ceremonies various priests represented different gods and dressed accordingly.

The habitations of the farmers and poorer classes were wattle and daub with thatched roofs. Better class homes were made from adobe blocks and the houses of the wealthier people and governmental buildings were of cut stone. The pyramids or temple platforms were of stone but the temples were generally of wood with thatched roofs.

Many of the houses were erected on piles because of the swampy condition of the city and the frequent floods.

The walls of the structures in Tenochtitlan and other towns around the lake were covered with white plaster or were colored a dull rich red. Some of the more important buildings had decorations painted on their walls but for the most part the Aztec capital was a white city.

From all accounts it was indeed a beautiful place. The green of its numerous trees the sparkling blue waters of the surrounding lake and many canals the gay splashes of color from flower beds on the roof tops and in the gardens the multitude of canoes loaded with products from the field and garden and the brightly hued garments of the populace all contrasted with the white and dull red of the buildings to make an enchanting scene.

The interiors of the better houses were cool and spacious and most buildings included a courtyard or patio features still seen in many parts of the present city.

The daily life of the people was a busy one. Women were occupied with numerous household duties. The rooms and courtyards were carefully swept and cleaned. Corn or maize was ground to make meal for the tortillas even as it is ground today in many parts of Mexico. There were rich sauces and other foods to prepare.

The markets of the city were as interesting as those of today. Most of the trade was by barter but a form of currency consisting of feather quills filled with gold dust was used occasionally.

GIRLS MARRIED YOUNG

The older men taught the young boys when they became older they were sent to schools and prepared for either the priesthood or the military service or were apprenticed to merchants or artisans.

There were schools for girls as well but

unless they went into one of the religious orders their education was not so rigorous as that of the boys. Girls were married between the ages of 11 and 18 all arrangements being made by their parents or priests. There were numerous ceremonies requiring the preparation of fruit, foods, flowers and cloth as offerings to the gods.

The men devoted much time to military affairs and the general business of the city. Some served as bodyguards for the merchants others as burden bearer apprentices. Many were engaged in the various trades and those who entered the priesthood led an extremely active life.

WARRIORS BECAME LANDOWNERS

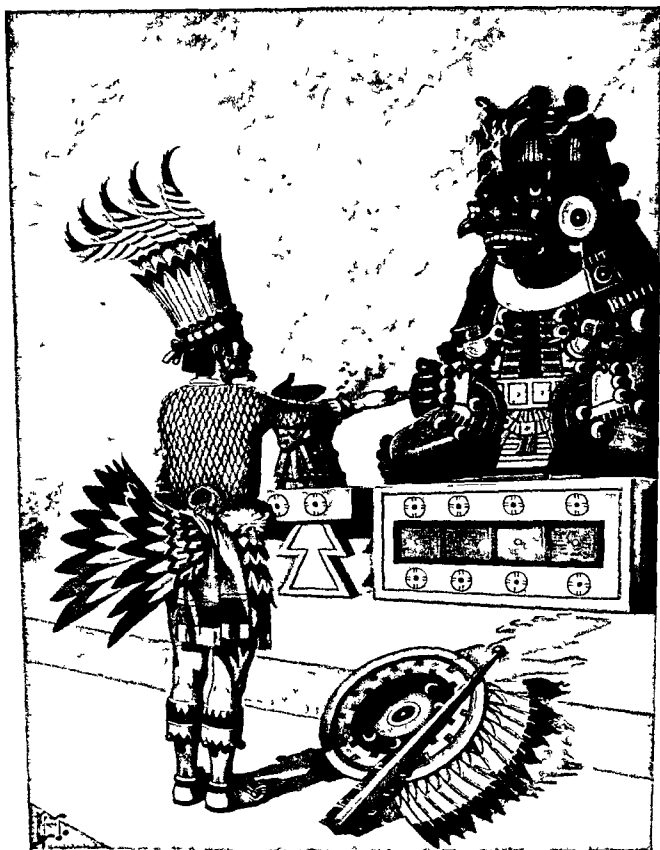
The social organization of the Aztecs was a complicated one. All land was owned in common by the tribe and the chiefs—usually two for each tribe—were chosen by the people. These offices were not hereditary and unsatisfactory chiefs were deposed.

As time went on and the power of the tribes increased such customs changed. Under Itzcoatl the ruler who made Tenochtitlán a power, social classes based on captured wealth made their appearance and a tendency toward inheritance of office was noted. There was a distribution of spoils and land for the first time.

Conquered territory went to the warriors and made for a class of wealthy landowners. Members of the military body were able to advance themselves through merit and the priesthood occupied a high place. Certain crafts placed the artisans in upper classes and gave them special privileges.

Whether the entire organization was a monarchy or a democracy is largely a matter of definition. Even after the inheritance of office became established men were nominally elected to their positions and when not satisfactory were ousted. There was a class of outcasts composed of those who were driven out of their own groups for infractions of laws of those from other tribes who came to the city and of those who failed to cultivate their gardens.

There were slaves but they were not slaves in the present accepted sense of the word. The labor of people in this group belonged to another but their persons did not and it was entirely possible for a slave to have slaves of his own. The owner of a slave's labor could not sell it to another person without the consent of the laborer.



© National Geographic Society

Painting by H. M. Herget

GRANT US O DREADED ONE VICTORY IN BATTLE!

By thine aid we have subdued many tribes and forced them to pay us tribute of gold, emeralds, amber, turquoise, and honey. So might a warrior have prayed to Huitzlopochtli about the time Cortez invaded Mexico. On the idol's cuffs rest two hummingbirds, symbol of the war god. The suppliant wears a feathered headdress and bustle denoting his military order. Shield and war club lie on the floor. Fighting and religion were the principal Aztec pursuits. Paintings in this series are based upon records left by the Spaniards and sculptures recovered by the Mexican Government.



© National Geographic Society

WAR CLUBS CLASH AS EAGLE LIGHTS CAITIVE IN A JALALI CLEMENCY WATCHED BY THOUSANDS

Painting by H. M. Herget

If the prisoner bests five warriors he gains freedom but since he battles shieldless and tethered he has slight chance. Feathers fringe the sides of his long club while the opponents' weapons are edged with sharp obsidian blades. If the captive wins the first encounter he meets another warrior of the Eagle clan (left) then two jaguars and finally the left-handed fighter behind the stone. A priest dressed as a black bear referees the fight.



© National Geographic Society

A FATTED HUMAN SACRIFICE DIES WITHOUT FLINCHING AS A LAINTED PRIEST TEARFULLY PLUNGES OUT HIS BLATING HEART
 Two black-robed priests hold the young victim's head, arms and legs while the official in red slits the youth's chest, grasps his heart and offers it to the god of war (left). Aztecs sometimes chose the victim from their own people. He was fasted upon delicacies, wore rich raiment and was entertained by comely maidens. Then came the fatal day when, amidst pomp and ceremony, he sacrificed to meet his god. This painting is based upon an eye-witness account of the ceremony recorded by one of Cortez's followers. Thousands of prisoners were sacrificed annually, but without the fasting!

Painting by H. M. Herget



Pe n nes by H. M. Herget

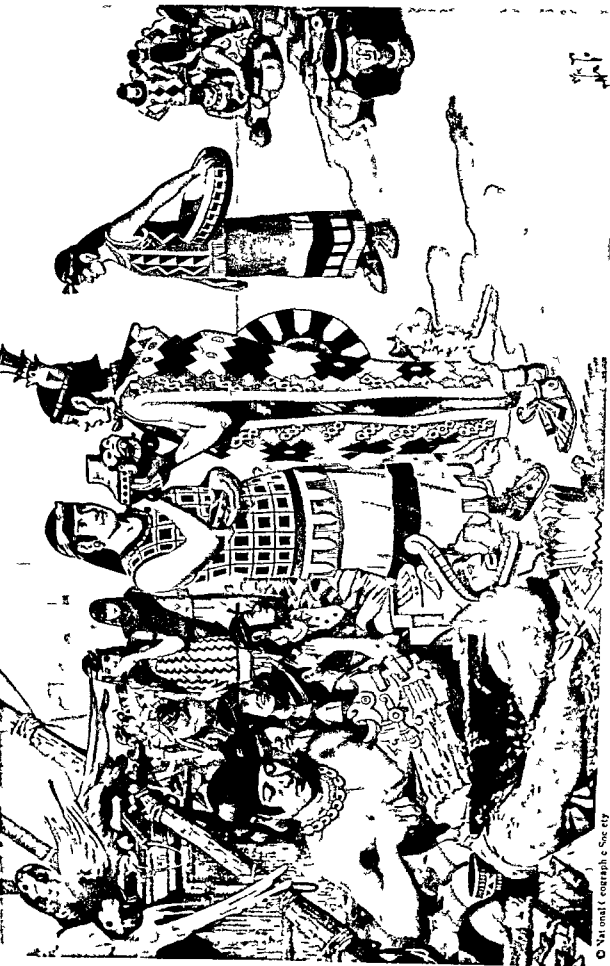
DAUGHTER EARLY LEARN'S HER MOTHER'S ART

Reeds for these baskets came from swamp lands that once surrounded Tenochtitlan, the Aztec capital. Corn grows beyond the perimeter of the thatched houses.



© National Geographic Society

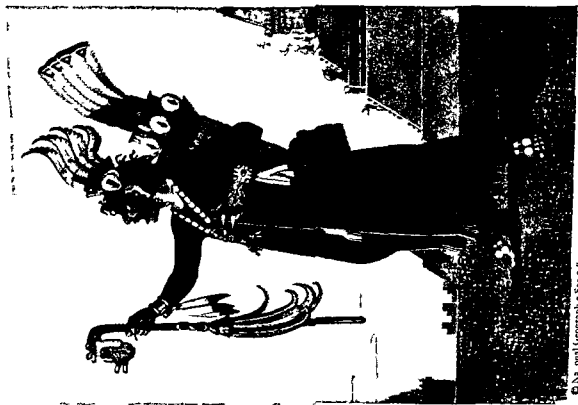
OFF TO MARKET WITH TURKEYS, PARROTS, AND SQUASH
Even today Indian farmers carry the varieties of turkeys, parrots, and squash on
saddlebags, taking 10 or 20 miles. Native Americans domesticated the
turkey long before the Spaniards came.



© National Geographic Society

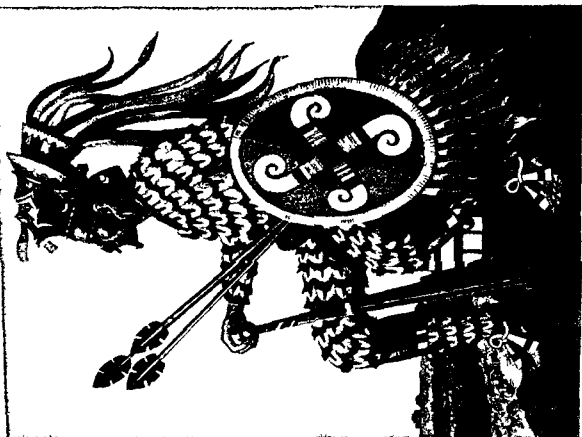
SQUATTING IN THE MARKET PLACE A WOOD CARVER WITH OBSIDIAN TOOLS CHISELS A TEMPLE DECORATION
 Pottery dogs and macaws are specialties in this mart. Highly decorated pots at the right came from outside the Aztec realm for local artisans preferred simpler designs. A cloth awning its edge visible in the upper left corner partly shields buyers and sellers from the burning sun. A Spanish chronicler declared that the hum of voices in a busy market could be heard several miles away. Though fabulously rich in gold and silver Aztecs traded principally by barter. Their society comprised three definite classes: nobles, commoners and slaves.

Illustration by H. M. Herget



© National Geographic Society

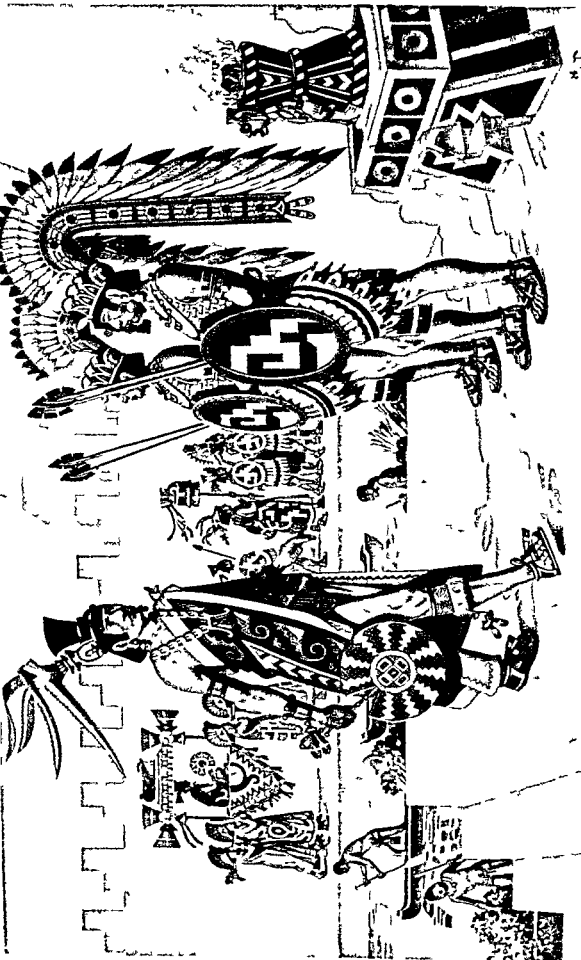
THIS HIGH PRIEST SUPERVISES TENUJI RITES AND CEREMONIES. His hair is matted with human blood. Scepter, crown, and cloak bear signs representing minor gods. Priests usually dressed in black and stripes were painted across the faces (Plate III). A pyramid temple stands at the right.



Painted by H. M. Heret

AN AZTEC CATLIN WATCHES FOR THE TOP

Ear plugs and lip and nose rings denote his rank. Beneath the feathers is a cotton garment soaked in brine to make it stiff and impervious to arrows. Eagles and jaguars of the palatine varr or class carried javelins clubs and shields.



© National Geographic Society

TLATEL GUARDS STAND AT ATTENTION WHEN AN AMBASSADOR FROM ANOTHER TOWN ENTERS THE SACRED SHRINE. As his badge of office this Aztec diplomat carries a fan. Incense made of copal and rubber burns near the temple wall. Across the canal a rich chieftain sits in a litter, preceded by numerous retainers. When Cortez's soldiers came to Tenochtitlan, now Mexico City, they found it crisscrossed with canals along which most of the capital's traffic passed. Streets of today follow many of the old waterways.

Painted by H. M. Herget



© National Geographic Society

Painting by H. M. Herget

"LET US PREPARE AN OFFERING FOR THE GOD OF FLOWERS"

Not all Aztec rites were hideous orgies of human sacrifice (Plate III) for the people had many gods. Priests' headdresses and back ornaments were of light basketry decorated with carvings and quetzal feathers. Sacred symbols decorate the fringed cotton robes. Each ceremony had its special costume. Incense burns on one of the frescoed altars in the background.

The organization of the city was elaborate. After settling on the islands the Aztecs separated the area into four quarters. In each of these was a phratry composed of kindred peoples or those of common descent. There were 20 kin to a phratry. Each kin elected and deposed its own officers, consisting of a governor and a group of Elder Brothers, or council.

There was also a group of councilors known as "Grandfathers." This group was in the nature of an order for merit and was open to any who qualified by warlike prowess, bravery, and superior shrewdness. Courage alone could not secure it.

Actions denoting particular wisdom, exceptional service in the councils, and extraordinary ability in trade also made a man available for the honor. Furthermore, it was conferred upon those who passed through a series of cruel ceremonial rites which put the courage and self control of the candidate to the severest of tests.

At the head of each phratry was a war captain. These four captains served on the great council of the tribe in company with one representative from each kin. Elder Brothers and certain of the temple priests. There was a smaller council, composed of one speaker from each kin, which met every 20 days in a directing and judicial capacity. The great council met every 80 days, separating into two judicial bodies which sat simultaneously and passed on all important affairs.

At the head of the entire tribal organization were the Chief of Men and the Snake 'Woman.'

The Chief of Men, elected by the council, was the executive officer. He later became the king or emperor. Toward the end of Aztec dominance in the Valley there was definite lineal descent of the office of Chief of Men, but even then he was voted upon by the council.

The Snake Woman was elected for life, but he could be removed for cause. He was a second emperor and functioned as a Secretary of State. All intertribal affairs were under his jurisdiction. He also kept account of the tribute from subject peoples and was the keeper of the tribute rolls—pictographic records of the materials to be paid by each conquered tribe.

There were two major divisions of crime among the Aztecs. One was the crime against a person's own group, the other an offense against another group. The group

to which an offender belonged was obligated to see that he was brought to justice. Murder was punishable by death.

DEATH FOR THE INTEMPERATE—EXCEPT THOSE OVER 70

Intemperance, except for those who had attained to the age of 70 years, also carried the death decree.

Theft had varying degrees of punishment, according to the amount or nature of the stolen goods and the number of offenses charged against the individual. The stealing of gold or silver was a major crime and offenders were flayed. Lesser crimes carried terms of imprisonment.

A priest who broke the law was put to death. In certain cases the offender paid the death penalty on the great stone of combat in the Zocalo.

Slanderers were punished by their own kin. They had their lips cut off.

The legislative power was vested in the ruler. He laid down the laws and stipulated the penalties for violations of his edicts.

Each phratry had a magistrate, elected for personal ability and integrity. The Aztecs were remarkable for their day and age in fact, were superior to some modern governments, because there was an impartial treatment of all cases brought before the magistrates. The lowliest laborer and the richest noble were accorded equal justice.

Taxation bothered the average Aztec even more than it does present day peoples. From 30 to 33 1/3 per cent of everything went into taxes. Each section had great storehouses for the materials received for this purpose. Food, clothing, animal skins, pottery, gold, silver, feathers, tools and similar objects were paid into the treasury.

At one time the king of Texcoco was supported by tribute from 29 cities. Fourteen cities furnished it for one half of the year and fifteen for the other half.

WAR WAS THE AZTEC NATIONAL SPORT

Warfare constituted an important activity of the Aztecs. Various factors contributing to this condition. Traders or merchants going to other cities were preyed upon and resulting skirmishes between their guards and alien troops frequently led to war. Increasing costs of governmental activities and ever growing demands by the priesthood for more and more victims to sacrifice



Photograph by Branson De Lou from Galloway

COLLEGE STUDENTS TAKE NOTES ON THE HUGE AZTEC CALENDAR STONE

By reading the intricate markings on this 24-ton monolith of basaltic porphyry, priests are believed to have kept track of seasons and festivals and been able to tell farmers when to sow and reap their corn. The central figure of the sacred stone symbolizes the sun. Placed around this face are rectangles representing the four elements: earth, air, fire, and water. Other symbols are supposed to stand for days and years. Dug up in 1790, the Stone of the Sun was later set up here at the National Museum in Mexico City. Miniatures are popular as souvenirs.

to the gods played no small part in the promotion of conflict.

As a matter of fact, the Aztecs continually sought pretexts for starting hostilities. They deemed themselves "idle" if no war was in progress.

Actual declarations of war were decided upon in the council by very formal proceedings. The highest in military command was the Chief of Men, or Emperor, and he was assisted by the war chiefs.

These officers had three grades or ranks. First were the chiefs of the great subdivisions, the principal quarters of the city, and below them came the captains of the Kins, or minor quarters. All of these officers were elected on merit; their rank was not transmissible by inheritance and they could be deposed. Below the captains were the meritorious braves composed of three classes—the Tigers or Beasts of Prey, the Eagles, and the Wandering Arrows.



Photograph by Rudolf Rudger

CHAPULTEPEC, IN THE AZTEC TONGUE, MEANT 'GRASSHOPPER HILL

Water from its springs was carried to the near by capital by an Aztec aqueduct. Here Montezuma had his hunting lodge, harem and baths. The present Castle of Chapultepec was begun in 1783 by a Spanish viceroy and served as a residence for Mexican Presidents until recently.

These titles were honorary and were obtained solely in actual combat by the capture of one or more prisoners. Men in these groups served as scouts and skirmishers in the van of the army and acted as leaders of small bodies of men on occasions they commanded larger subdivisions if their superiors deemed it necessary.

The meritorious braves had their hair cropped closely over the ears as an indication of their rank, and wore, chiefly but not exclusively, the masks or helmets imitating the heads of wild animals and sometimes even the skins of those animals.

SWORDS OF WOOD AND OBSIDIAN

Common warriors comprising the last group in the military organization wore the quilted cotton armor of the Aztecs. Their weapons consisted of darts or javelins with heads of obsidian or copper, also slings and stones, bows and arrows and a sword or club. The javelin was the principal weapon, one form of it is illustrated in the picture of the warrior in Plate VI.

The sword called *maccuahuitl*, or sometimes *macana* was of wood. It measured three and one half to four feet in length,

was four to five inches in width, and an inch to an inch and a half in thickness. Pieces of obsidian three inches long and two inches wide were fastened in grooves along the edges with cement made from the root of a tree pounded up with a certain earth and mixed with the blood of birds and bats. The warriors in the various colored illustrations are shown with weapons of this type.

For defense the warriors used round shields of the parrying type which did not cover a large part of the body. Made of canes netted together and interwoven with cotton, they were covered on the outside with painted boards and feathers and were so strong that only a crossbow shot at close range would penetrate them.

The tactics used in combat were intricate and showed a good knowledge of military technique. Expeditions were never protracted however, and all hostilities stopped at nightfall. Only two night engagements took place during the Conquest. One of these is outstanding and is called by Spaniards the *Noche Triste*, the Sad Night, when Cortez and his cohorts were driven from the city (page 732).



BUILDING A FLEET OF GUNBOATS, CORTÉZ ATTACKS MEXICO'S CAPITAL BY WATER

With fresh supplies and thousands of Indian allies the Spanish launched a second campaign against the Aztec metropolis. On the lake depicted in this painting by conventional curliques Cortez Marina and soldiers (above) arrive in a cunibot alongside a broad causeway. There Spaniards and Tlaxcalans battle their way past a pyramidal temple bearing a sacrificed human head. Aztec warriors including a Jaguar (Plate II) defend the causeways with help from natives in canoes. After a siege of nearly three months Cortez entered the city in triumph.

The Aztecs were exceptionally fine engineers for a people in their stage of development and constructed elaborate causeways leading from the city to the various towns around the borders of the lakes. Today the Pan American Highway runs into the city along one of these ancient causeways.

Particularly was Aztec engineering skill shown by a great dike erected during the years 1440-1450 to prevent flooding of the city by the Lake of Texcoco. This engineering work extended for about ten miles from Atzacualco on the north to the hill called La Estrella on the south. It was constructed with a core of clay and stone and crowned with a wall of rubble masonry.

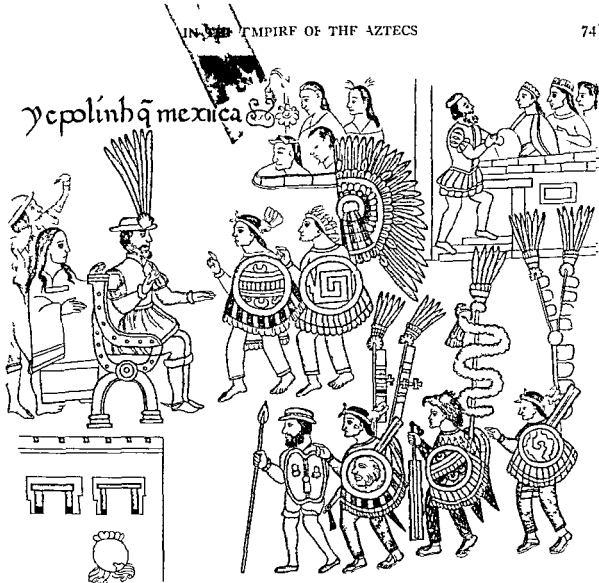
On either side was a strong stockade to break the force of the waves. There were

numerous openings for canoes. These passages were provided with sluice gates to control the water when the lake rose and threatened to inundate the city. They also could be opened in summer to let fresh water into the lake when its level was lowered by the rapid evaporation of the summer months.

This dike was erected during the reign of Montezuma I and the King of Texcoco Netzahualcovotl, was of considerable assistance to Montezuma in planning and helping with its construction.

RELIGION DOMINATED ALL ELSE

The dominating factor in all Aztec life, economic, social and military, was religion. Everything revolved about the gods and all



MEXICO'S RULER STOICALLY SURRENDERS TO THE CONQUEROR

Cortez with ceremonial feathers in his hat is seated on the roof of a house. Behind him is the faithful Marina. Before him stands Cuauhtemoc, the Aztec sovereign (page 729) who reputedly pleaded 'I have surely done my duty in defense of my city and I can do no more. Take that dagger that you have in your belt and kill me at once with it.' Below, a Spanish soldier guards Mexican dignitaries. On the roof (right) Cortez receives Cuauhtemoc's wife and family. The legend on the painting reads: 'With this event the Mexicans were finished.'

efforts were bent toward placating the complex group of numerous deities.

Every day, every night, week, month, and year had its own particular god or goddess and, according to the belief of the people, if these were not properly propitiated or had not received sufficient offerings, the world would come to an end at the conclusion of the 52-year calendar round, a period which corresponded to our own century designation.

The most important gods were probably Huitzilopochtli, the War God (Plate I), and Tlaloc, the God of Rain. Other deities were associated with flowers, maize, the earth, the sky, drunkenness, the lower regions, birth, and death.

The priesthood was extremely powerful

and its members were often civil as well as religious leaders. Two priests were at the head of the hierarchy. They were elected by the other priests on the basis of merit gained through careful observance and performance of all religious duties.

These two appointed other officials, one of whom was Mexicatlteuatzin (Color Plate VI). He had charge of minor priests and it was his duty to see that the rites and ceremonies were observed with due care and perfection in all the towns and provinces.

Especially, he supervised the priests in charge of the education of the youths in the monasteries. He also ordered all the religious houses to be built in the provinces subject to Tenochtitlan. As an added duty

he ordered punishment for all priests under his orders who had sinned in any way.

Women also performed ceremonial duties and there were regular nunneries for them. The women who entered religious institutions took a vow of chastity and the rules for its observance were very strict.

The priests had a busy routine. Incense, consisting of copal and rubber, had to be burned before the figures of the gods four times each day and three times each night, in fact half the priestly duties were nocturnal. On the altars before the gods, the priests placed offerings of various kinds: food, clothing, flowers, and other objects.

The most important offering, however, was that of blood and the sacrificial rites connected with this phase of the religion are those most often associated with the Aztecs, although earlier peoples in Mexico, the Maya of Yucatan, for example, also had such observances.*

The priests poked thorns through their tongues, cheeks, and ears to obtain blood. The torn and ragged appearance of a priest's ears was one of his characteristic features, clearly shown in the various paintings (Color Plates III, VI, and VIII).

HOW HUMAN SACRIFICES WERE MADE

Pigeons or quail were a common source for blood offerings, but the all important sacrifices for the major ceremonies were human victims.

Various methods were used for dispatching victims. Some were drowned, in rites similar to those practiced at the Sacred Cenote at Chichen Itza by the Maya. Others were shot with arrows. Occasionally the priests clubbed a victim to death. Sometimes the human offering was sealed in a cave and allowed to starve to death.

The commonest method, and that frequently described, was to put a victim over a stone, slit his chest with an obsidian bladed knife, tear out the heart and offer it to the god, as is well depicted by the artist in Color Plate III.

Spanish priests and soldiers who witnessed such scenes have left vivid descriptions of them. Sahagun, to whom we owe much of our knowledge of the Aztecs, tells us that the owners of captives delivered them to the priests at the foot of the temple stairway. The priests then dragged them

up by the hair, and, on reaching the top of the pyramid, pulled them over toward the sacrificial block of stone about two feet high and a foot and a half in width.

The victim was thrown across the stone on his back. Two priests held his feet, two his arms, and one his head. The priest who was to kill him came forward and struck him a blow on the chest with a flint knife held in both hands. He cut a hole in the chest, thrust in one hand, and tore out the heart, which he then offered to the sun before placing it in a bowl and setting it on the altar before the god. Sometimes the heart was placed in the mouth of the god.

The body of the victim was thrown down the steps of the pyramid and carried away to be cut up and distributed in small pieces for ceremonial cannibalism.

The victims of such rites were captives, criminals, children, or young men or women especially chosen and prepared for the ceremony by a series of rites extending over a considerable period of time.

These heart sacrifices were held at stated intervals. There was always a ceremony of this nature at the end of every year, a great sacrifice at the end of every thirteenth year. The longer the period of time, the greater the number of victims.

FIGHTING FOR LIFE WITH A FEATHERED DODD SWORD

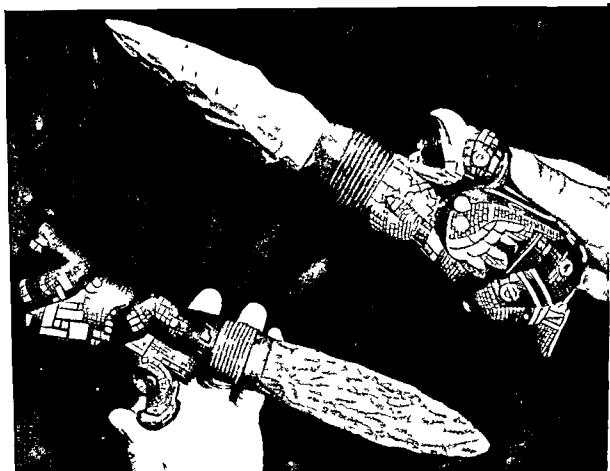
Next in popularity was the sacrificial fight in which a number of warriors engaged a victim in mortal combat (Plate II).

This was always a great spectacle. The victim was tied to a stone, called the *Tema lacatl*, and forced to fight warriors who were fully equipped while he was armed only with clubs and a sword edged with feathers instead of obsidian blades.

The stone was set on a platform in the center of the great temple enclosure where all could see. It was similar to a large millstone and had a hole in the center to which the victim was tethered by a rope tied around his waist. The captive could walk around the stone but could move only so far before the rope checked him.

The artist has shown a rope tied to a smaller stone (Plate II). This type of fastening is illustrated in some of the manuscripts but probably was not so common as the larger type of stone on which the combatants stood and moved about.

* See *Yucatan: Home of the Gifted Maya* by Sylvanus Griswold Morley, NATIONAL GEOGRAPHIC MAGAZINE, November 1936.



Photograph by Lu Marden

WITH SUCH KNIVES PRIESTS CUT OUT THE HEART OF SACRIFICIAL VICTIMS

Sharp flintlike stone or obsidian blades, their wooden handles encrusted with mosaic, were used in the ceremony depicted in Color Plate III. These reproductions in the National Museum at Washington, D. C. were copied from originals in the British Museum. Between 20,000 and 50,000 victims, mostly prisoners of war, were sacrificed yearly in the Aztec domain.

Sahagun is again the source for a good description of the rites at the Templo Mayor. From the top of the Temple a large number of priests would appear in their costumes, each representing one of the gods. They formed a long procession and were followed by the warriors, two Tigers and two Eagles. These men were armed with swords and shields and advanced in a fighting attitude, making motions like fencers.

When the procession reached the foot of the stairway it advanced to the stone and formed a wide circle around it. The priests seated themselves and began at once to play on their flutes, trumpets, and shell horns to whistle or to sing.

The victim was then dragged forward. He was given pulque, liquor of the country. He raised the bowl to the east, the west, the north, and the south, as if offering it to the cardinal points of the world, and then drank the liquid through a hollow cane.

A priest came forward with a quail, tore its head off in front of the captive, took the captive's shield, raised it high above his head and then threw the beheaded quail behind him. The victim was made to take his place on the stone and was tied with the rope fastened to its center. This was done by a priest dressed to represent a bear (Plate II).

The captive was now handed the sword with feathered edges and the skirmish began. One after another of the warriors, armed with real weapons, fought the victim. Sometimes the captives were very brave and wore down the four who sought to kill them. In such cases a fifth, who was left-handed, was sent against him and usually conquered him.

The victim's breast was then torn open and his heart offered to the sun. The body was carried away, skinned and cut up, and the flesh was distributed for ceremonial eating.

The skin was worn about the streets by some warrior and everyone who met him presented him with a gift. These gifts were taken to the man who had captured the victim and he distributed them as he saw fit.

FOND OF FLOWERS AND GAMES

Despite these bloody rites the Aztecs were not so savage as many have thought them. They had numerous ceremonies in which there were dancing and singing, and the main offerings were flowers and fruits. Their love of flowers is one of the traits handed down to their present-day descendants and is one of the noticeable features about modern Mexico City. The music was produced by wooden and pottery flutes, conch shells, rattles, drums, and rasping instruments made from notched bones.

The Aztecs were fond of all kinds of games, the best known being *itlachtli*, for which there was a special court. The players endeavored to propel a rubber ball through rings set vertically in the walls. The rules required that the ball be struck by the hips of the players; they were not permitted to use their hands or other parts of the body.

Tumbling and juggling of all kinds were very popular. Montezuma II, the emperor at the time of the Conquest, was especially fond of acrobatic performances and of dances. A house near his palace was devoted to the dancers and he also had dwarfs and midgets to entertain him.

The zoo and aviary impressed the Spaniards. They saw animals that were new to them and were amazed at the variety of species exhibited. Many of the soldiers saw their first American buffalo in Montezuma's zoo and one of the earliest descriptions of that animal is in the writings of Cortez himself.

The Spaniards were also fascinated by the serpents in the zoo, particularly those with bells on their tails, the rattlesnakes.

BIRDS KEPT FOR THEIR FEATHERS

Every kind of bird known in Mexico and some from other areas as well was in the collection in the aviary. There were eagles, macaws, and quetzals, also parakeets—tiny specimens with brilliant plumage—and numerous long-legged water birds. They were kept for their feathers, which were plucked from time to time as needed.

The feathers used in the royal fans, head dresses, cloaks and other paraphernalia came from the aviary. Special attendants cared for the birds and were particularly attentive during the breeding season so that there would be a continual supply.

The Aztecs were extremely superstitious and magic and shamanism were widespread. There were fortunetellers, sorcerers, medicine men, and witch doctors. The people consulted fortunetellers continually to determine whether the fates were propitious for any proposed event, such as a journey, a business transaction, or any ordinary feature of their daily life.

All kinds of divination and prophecy were popular. Certain days were regarded as unlucky and no new undertaking would be started then. A child born on one of these days was doomed to misfortune throughout life. This attitude gave the priests a strong hold on the people and much of their activity was concerned with divination.

For treating diseases the medicine men had a number of methods. Commonest and most consistently used was the sweat bath, although some forms of sickness were treated by sucking the cause of trouble out of the patient.

HIGHEST HEAVEN FOR VICTIMS OF BATTLE, SACRIFICE, AND CHILDBIRTH

When an Aztec died there were a number of heavens to which the spirit might go. Those slain in battle, victims of sacrifice and women who died in childbirth went to the highest heaven. Death from storm or lightning sent the soul to a heaven of plenty at the top of a hill. A person prosaically dying in bed from natural causes had to go down below to a place called *Mitlan* and death from corruptive diseases sent the spirit to an even lower place.

The funerals of wealthy people or those of the upper classes were elaborate, while those of the poorer classes were extremely simple. In the case of the well-to-do of ferings of jade, gold and other valuable articles were placed in the tomb. A poor man was fortunate if an ordinary clay vessel was placed in his grave.

As a people the Aztecs developed one of the most interesting New World cultures, and despite the fact that they passed from power and prominence more than four centuries ago they still exert a definite influence on all things Mexican.

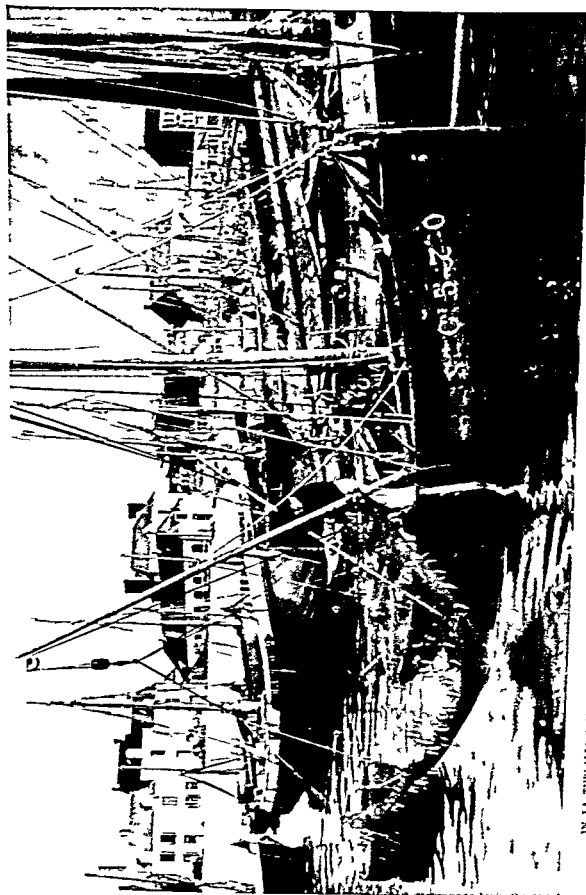
Where Bretons Wrest a Living from the Sea



Photograph by F. W. Goro

WHITE COIFS BOW OVER PURSES AS BRETON HOUSEWIVES COUNT THEIR SOUS

Thrifty—they take stock of funds while riding home from market across a bay in Brittany. The white lace headscarves, boned and starched, vary in style in the different cantons (pages 761 and 765). Seagirt Brittany, westernmost tip of France, was named after Britain, homeland of Celtic colonists who fled here to escape Saxon invaders during the fifth and sixth centuries. A seafaring race, the Bretons number among the celebrated sailors Jacques Cartier, discoverer of the St. Lawrence River. Mr. Goro's photographs depict life in the Guérande peninsula, southern Brittany.



IN LA TURANTE CROWDED HAULER A FISHERMAN D MONSTRATING ONE WAY OF CATCHING BRITTANY & LAMID SARDINES
 The boat is full of nets and the crew are all busy with the nets. The boat is a large fishing boat, and the crew are all busy with the nets. The boat is a large fishing boat, and the crew are all busy with the nets. The boat is a large fishing boat, and the crew are all busy with the nets.



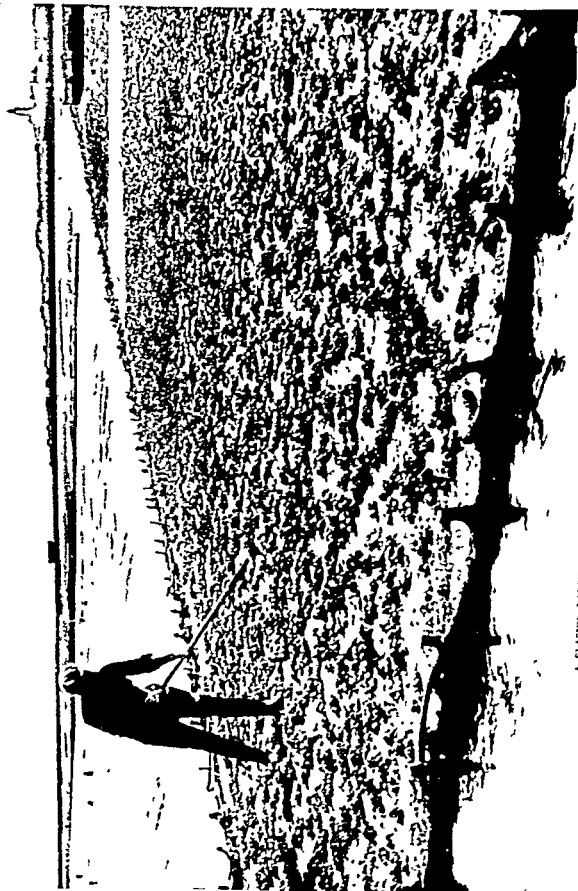
A RARE DELICACY IS THE "SEA CAT," A SMALL SHARK
Photograph by F. W. Goro

Wooden shoes are worn at sea as well as ashore. "I once live the sabots of wood!" runs the refrain of a song relating how Anne of Brittany wore her native footgear when she mounted the throne of France some 450 years ago.



"FIVE FRANCS BIDI WHO'LL GIVE SIX FOR MY FISH?"

Housewives and shopkeepers gather on Le Croisic's sea wall as the fisherman auctions off his day's catch. Bretons have 'a humor as flexible as their character is obstinate,' wrote Chateaubriand, a native son.



A SLANDER FARMER RAISES IN HIS CROP OF 'LOOSE MAN'S OYSTERS'

He raises the black, edible mussel (the bay of Le Croble on a sandy beach which is flooded at high tide (page 759) Abundant along the coast of Brittany, these edible mollusks have been cultivated by man for more than eight centuries. A shipwrecked Irishman named Walton reputedly invented the wooden enclosure in which the mussels are grown. He laid out the fences of the enclosure in such a way that they formed the initial of his name.

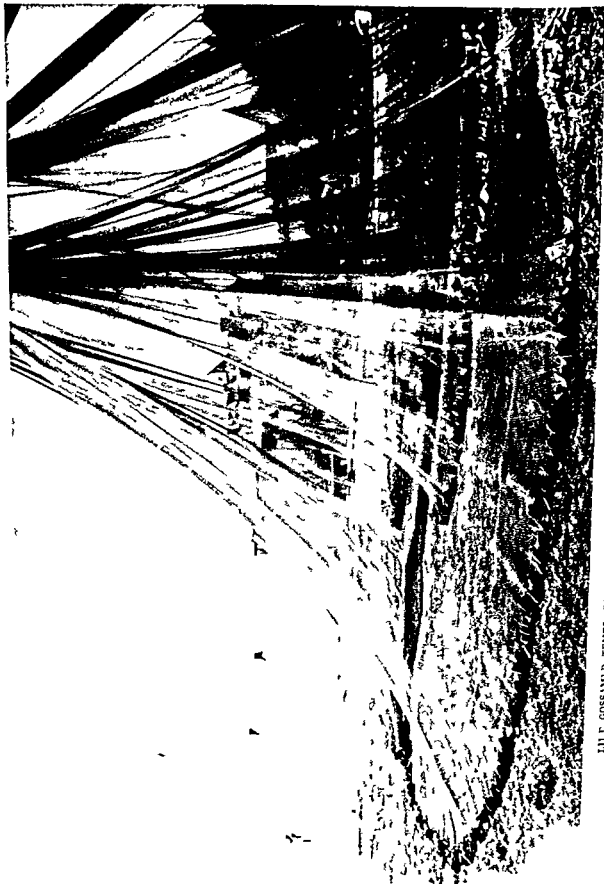
Photograph by F. W. C. M.



Photograph by I. W. Goro

ON SUNDAY FISHERMEN ENJOY A BUSMAN'S HOLIDAY AMID NETS AND SAILS ABOARD THEIR VESSEL

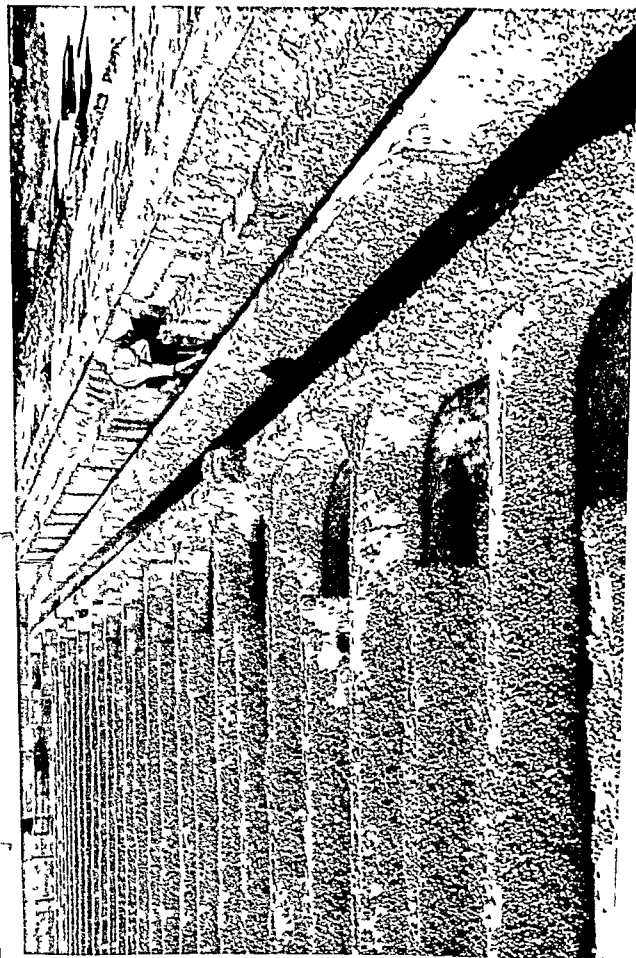
The men's every day pants and jackets range in color from brightest red to most delicate pink with patches of other brilliant hues. When a fleet departs on a long voyage the young girls of Le Croisic bid their sweethearts adieu with a song called, Sea Gulls. Breton codfishers who for centuries have ventured as far as Iceland and Newfoundland are immortalized in Pierre Loti's stirring novel. An Iceland Fisherman. Many sailors work on farms in winter and go to sea in February or March.



LINE GOSSE (MILK) TINTS SARDINE NETS ARE DRAPED FROM TALI POLES AND SPREAD OUT TO DRY

Photo by F. W. Goss

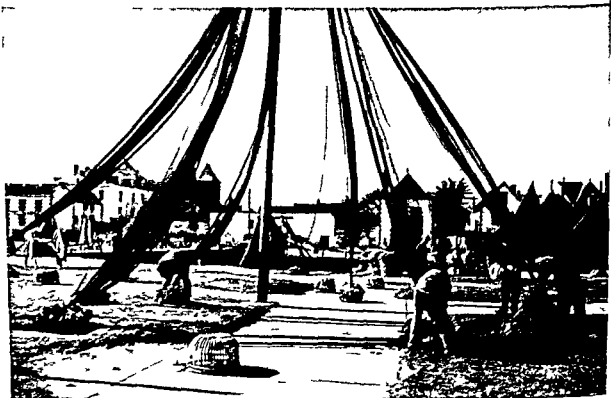
Co (first item of the fisherman's equipment) the gusseted sails are dyed a bright blue so that the fish attracted by bait cannot see the meshes in the blue water (page 10). The lower sails and floats on the upper make the net hang like a velvet curtain in the sea. Fishing is generally done from rowboats which fly off from the larger vessels. In front of La Cruz is a steeply sloped house as left men hold the nets in a line.



EDIBLE SEA SNAILS ARE THE HARVEST ON THIS "FARM"

Photograph by F. W. Goro

Myriads of small black mollusks grow on the sides of concrete tanks at Batz. At low tide they are scraped off, packed in sacks and shipped to large cities. The Frenchman regards snails much as Americans do the oyster. Paris restaurants devote tender care to their preparation, many first class establishments employ special snail waiters. Tons of different types of these mollusks are consumed daily in Paris at the height of the season.



NO MAYPOLE—THIS IS NET DRYING TIME IN LE CROISIC

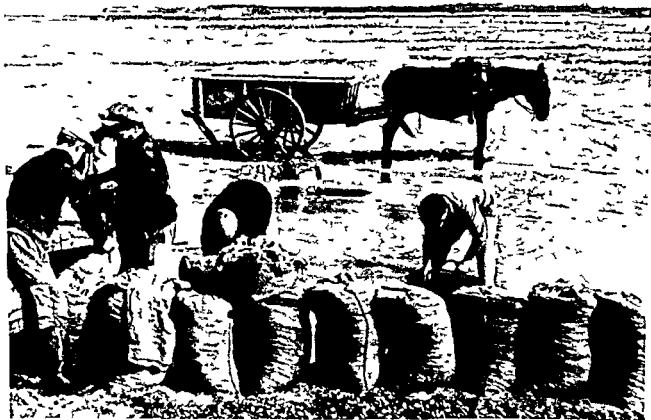
On the ground are several lobster pots or traps. Baited with fish, these are fastened to lines and lowered to the bottom of the bay. Scenting the bait, the crustacean enters the pot through the funnel shaped opening on top, drops inside, and is caged as in an old fashioned rattrap.



The ographs by F. W. Gore

WITH A "CLOMP-CLOMP" OF SABOTS SAILORS TRUDGE ASHORE BEARING THEIR NETS

Dolphins and tunnies often destroy the nets in their pursuit of sardines. Some fishermen use as sardine bait a powder made of peanuts. This beclouds the water, preventing the big fish from following their prey.



MUSSELS ARE SACKED FOR SHIPMENT TO CITY MARKETS

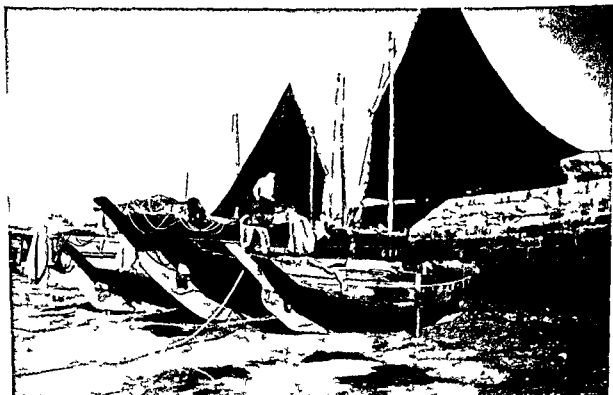
A dejected nag stand, fetlock deep in sand waiting to cart the sacks to Le Croisic whence they will be dispatched to Paris and other centers. Brittany's ancient Latin name *Armorica* came from Celtic words meaning "on the sea." No longer a governmental unit, the old province now includes five *départements*.



Photograph by F. W. Goro

YOU PUT YOUR FOOT IN IT WHEN WASHING MUSSELS IN A WIRE BASKET

Floated out from the shore on barges, the mollusks are washed in the salt water by men wearing hip boots. Crude sea boots are sometimes made by attaching oilskin uppers to sabots.



AGROUND AT LOW TIDE BOATMEN HOIST THEIR BRIGHT RED SAILS TO DRY

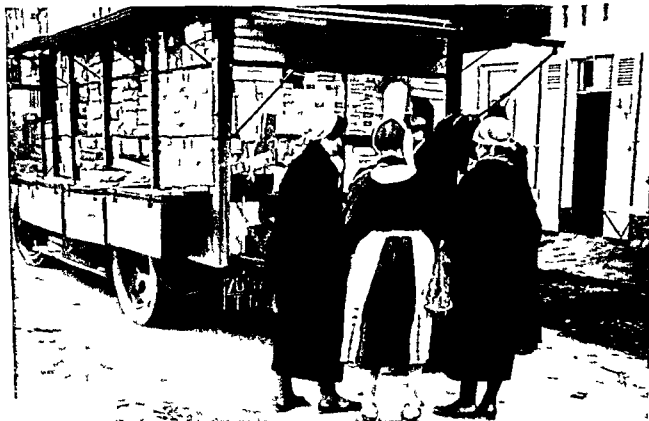
When the spring tide sweeps in at a speed of four knots through the channel leading to the port the water at Le Croisic rises more than 18 feet. Many sardine boats carry auxiliary motors.



Photographs by F. W. Goro

NETS FRINGED WITH FLOATS HANG LIKE GIANT SPIDER WEBS ON HOUSE FRONTS

The regular work done the fishermen set off for a wine-shop to relax and talk politics. Women and girls clean, sort, and pack the sardines, often toiling all night if the catch is unusually large. La Turballe had one of the world's first sardine canneries, established nearly 100 years ago.



A DEPARTMENT STORE ON WHEELS VISITS GUERANDE ONCE A WEEK

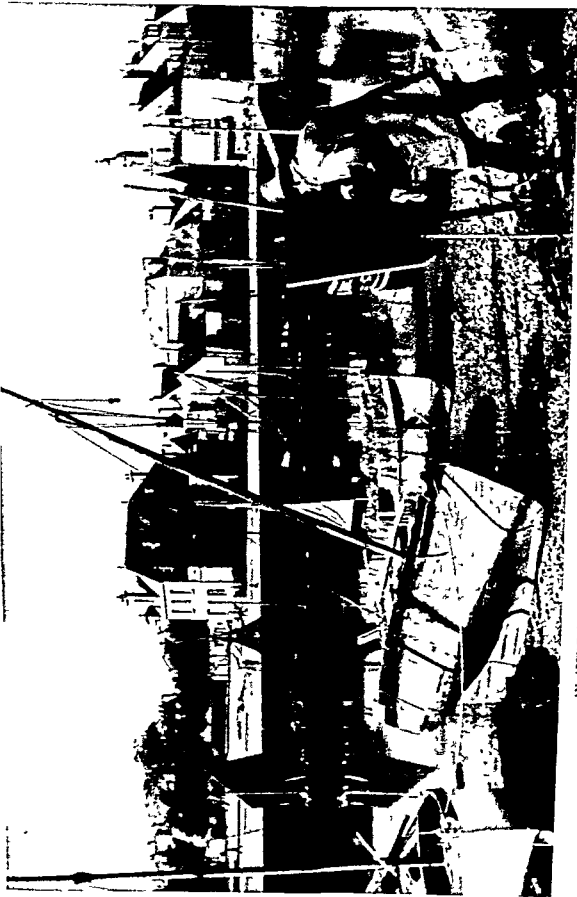
A toot of the horn brings women in coifs hurrying into the street. Here a housewife may buy a gay sweater for her husband, novelties for the children, and perhaps a bit of silk for herself.



Photographs by F. V. Coro

ALL THE COUNTRYSIDE GOES TO TOWN ON SATURDAY, MARKET DAY

Peat cutters from the plain of La Grande Briere, salt workers from the marshes (page 63) and fisherfolk from the nearby coast flock to Guerande to buy their week's supplies from farm women's baskets. Old-time coifs rapidly give place to more modern millinery here as in many of the larger Breton communities.



AN ARTIST AT IT. CHROISIC PAINTS A SCENE THAT ROBERT BROWNING TOLD

Settling sail to leave after Mrs. Browning's death in 1861, the poet spent two summers in this Breton village. Here he wrote one of his best-known poems, 'Hervé Riel,' the story of a local seaman who saved 22 ships of the French fleet after its defeat by the English at the battle of Ta Ilt, in 1692. 'Hervé Riel the Croisé' sketched the fleeing 'pandion' safe thru 'shoal and rock' to St. Malo while the English could only 'gnash their teeth and glare askance.'

Illustration by P. W. C. m



AS IN BROWNING'S TIME SALT WORKERS OF 'WILD BATZ'

GRUB THE GROUND FOR CRISTALS'

Photograph by F. W. Goro

From their Roman conquerors the ancient Bretons learned how to obtain salt from sea water in the 3 700 acre marshes at Batz near Le Croisic. Lying about 450 feet below high water mark, the rectangular reservoirs are flooded at spring tides. When the water evaporates workers gather the crystals and pack them in bags to be shipped. Coasting vessels from the north bring wine and wood in exchange for salt. Many of the marsh men go to sea during the fishing season.



Photo: apia by F. W. Goro

MENDING NETS IS THE FISHERMAN'S HOMEWORK

After each day's catch the nets are carefully inspected and repaired. This one with comparatively large meshes may be used to capture herring or white fish at Le Croisic. Breton youngsters swim go fishing and play with toy boats almost as soon as they can walk.



HEAVY UP TOSS YOUR SOUL LAUGH THE SAILORS

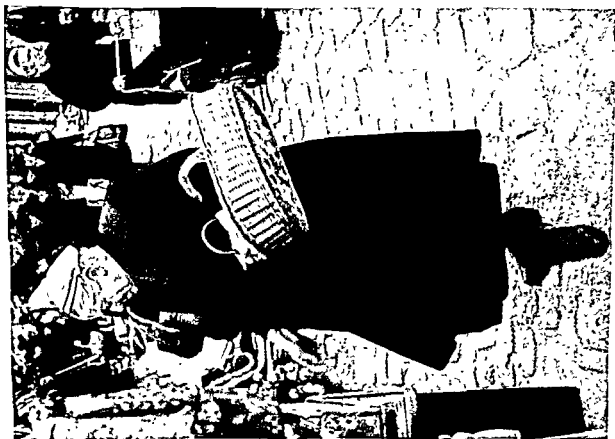
Pitching coins and bowling are favorite Sunday pastimes at Le Croisic across the channel from the large hospital on the Pointe de Pen Brion. Many of the fishermen are old men of war's men. Brittany has long been known as "the nursery of the French Navy."



Photographs by F. W. Goro

FINDING A PLACE IN THE SUN, MADAME STOPS TO KNIT

Rain or shine, the women seem always to keep their coils spotless. It has been estimated that more than 1,000 different styles are worn in Brittany. Many women can tell where a stranger hails from by glancing at her headdress.



TO BUY OR NOT TO BUY—THAT IS HER QUESTION

Typically Breton is this venerable shopper of Guérande, with her little flat coil and big umbrella. Brittany's ancient Celtic language, allied to the Welsh and Cornish tongues, is still spoken in many places.



Photograph by F. S. Cole

FLOWER AND VEGETABLE STANDS CLUSTER BEFORE A MEDIEVAL CHURCH IN BRITTANY

In the stone paved street of Guérande, shoppers stop to chat and peer into a baby carriage. Remnants more than five centuries old still encircle much of this town, which Balzac praised as a "correct likeness of the feudal ages." The first contingent of American troops sent to France during the World War landed in June 1918 at Nazaire, about ten miles southeast of Guérande.

MEN AGAINST THE RIVERS

By FREDERICK SIMPICH

NO MARKS made by man on his earth can compare, in magnitude, with the giant Mississippi levee system. It overshadows even the Great Wall of China.

More than 2,000 miles of dikes parallel this Father of Waters from Cape Girardeau, Missouri south to the Gulf of Mexico. These were built under the direction of U S Army engineers. Along many more rivers great and small, that flow into the Mississippi, still more dikes and levees have been thrown up—some by local authorities, some by the Army.

Into the Mississippi itself there pour the waters of so many hundreds of rivers, creeks and other streams that nobody even knows all their names. Fifteen thousand miles of its system are navigable; total length of all tributaries in a rainy year may be close to 300,000 miles. The whole mighty Mississippi Basin drains territory in 31 States and two Canadian Provinces.

Imagine the big river suddenly reversing itself, running upstream! How unexpected its ramifications—tiny water fingers reaching into gullies and roadside ditches from Montana to Pennsylvania!

Among its greater tributaries are the Missouri, Wisconsin, Des Moines, Illinois, Ohio, White, St. Francis, Arkansas and Red Rivers (map, pages 770-771). At no time in recorded history have all these been simultaneously in dangerous flood. Such a calamity is not good to contemplate.

WHEN 60 BILLION TONS OF RAIN FELL

But early in 1937, heavy rains along the Ohio alone swelled it to such unheard-of heights that it sent the greatest volume of flood water in Mississippi annals racing down that river.

All the rivers run into the sea, yet the sea is not full; unto the place from whence the rivers come thither they return again, says the Bible (Ecclesiastes 1:7). In what simple words Holy Writ condenses the Ohio flood's cycle of four phases: evaporation from Gulf and Caribbean clouds blown north two or three thousand miles; rainfall over the Ohio Basin; run off flood.

Man can tamper with only one phase of this great cycle—flood.

Yet look at its power!

Think, too, what strength Nature used

to get this water up out of distant seas and haul it north over the Ohio Basin, where they say 60,000,000,000 tons fell in 25 January days. To lift that bulk of water from the Gulf and the Caribbean and to move it so far probably took more strength than the combined power of all motors, machines, winds, waterfalls and animals then working in the whole United States.

To gauge such power, imagine this river, in January last as frozen solid from Pittsburgh to New Orleans—a 2,000-mile long glacier, sausage of ice sliding south across the United States at ten or twelve miles an hour, pushing down thousands of houses, bridges, trees—scraping away colossal cubes of field soil and river banks.

Time is a fourth dimension in floods, engineers say. Length, depth and width—they're the familiar old three. But time or the rate at which the stream runs, forms another.

On the State of Ohio alone in three January weeks some 28,000,000,000 tons of water fell. Furiously the Ohio rose till its whole winding course from West Virginia to Cairo, Illinois, where it empties into the Mississippi, was a boiling, stinking torrent of muddy water, clogged with smashed houses and barns, fences, furniture, telegraph poles, floating lumberyards, and drowned animals.

From whiskey warehouses in Lawrenceburg, Indiana, came infinite multitudes of empty barrels. For miles below they littered the world, lodged against trees, fences, railroad embankments, with a line of barrels many miles long rimming the hills, showing the high water mark.

Hit by mad currents, smaller hamlets were swept away; some may never be rebuilt at least not on the same sites. Every river town and city suffered inundation in whole or part. Paducah, with 35,000 people, was 90 per cent under water.

HOUSES SMASHED BY A RIVER RUN MAD

Pushed by racing icy flood winds and doors of houses first smashed in, then groaning and crumbling, the structures collapsed or turned crazily over and over and moved off downstream. People drowned.

As the Ohio rose, water backed up into every stream that feeds it and overflowed behind dikes and railroad embankments.

submerging towns villages and farms lights power and water plants failed Rescuers worked with kerosene lanterns Water to drink had to be imported One Cincinnati newspaper hauled in water by earloads and issued it free to get it people formed in line with buckets and cans

In this calamity rose odd bits of speech
 Top I've found our house called a small box • It's three miles down the river against some trees and upside down Everything's in it but what a mess!

Said others • Whose barn is that on our lawn? I bought a brand new Chevrolet that had been under water ten days for only \$25 I'm a mechanic In two hours I cleaned it out it runs fine

There's a cow walking around on our upstairs porch bawling for food

SOAKING AND SLIME BRING SLOW RUIN

One thinks of flood as a violent force tornadolike in lateral pressure sweeping all before it Not so in backwater or sluggish currents slowed down by walls and embankments

As in Paducah under water for 15 days or more it was slow soaking and settling slime which wrought ruin Walls and foundations crumbled in shop windows light objects of merchandise floated foolishly about on top of the water Candy in showcases turned to glucose masses streaked with color In a drugstore rows of muddy bottles stood on shelves their labels soaked off and a newsstand rack was a mass of sodden swollen pulp

In homes saturated mattresses and upholstery bloated to twice normal size wall paper peeled rugs were thick with slime and mud pianos and cheap glued chairs and tables literally fell to pieces

Grotesquely bedclothes rocking chairs picture frames baby buggies—and a cow—hung high in treetops tossed there by the flood's crest (page 779)

There's a dead horse against our kitchen door " complained a Paducah man It's been there three weeks PWA is supposed to be cleaning up the town Why don't they get that horse?

News dispatches told volumes in few words On board steamer *Thomas Moses* Henderson Ky January 28—Tied up in a cornfield five miles from the Ohio River in 15 feet of water and with 87 refugees on board 150 mules 350 hogs 14 cows 1 dog 4 chickens 1 guinea 1 peewee 2 quail 1 pheasant 1 coon and 1 possum

Aided by the Coast Guard Army engineers and private shipowners we used some 5863 boats in rescue and relief work said Admiral Cary Grayson head of the American Red Cross

At one time in one warehouse at Columbus Ohio we had stored 40 000 tons of food In all we ministered to more than 1 200 000 people—from Pittsburgh to the Gulf

Headlines and odd items from Admiral Grayson's scrapbook of the flood vividly unfold the sorry tale

Sees sister drown in flood

Few crazed convicts fight in flooded cells

Woman adrift 10 days

Missing Persons Bureau reunites families separated by flood

Flood drives 4 000 rabbits to levee quickly caught and sold

Thirteen men cling 16 hours to floating barn

Floods close 15 000 miles of highways

Flight from Missouri bottom lands like wartime exodus

Sometimes the dreary melodrama is lightened by a touch of comic relief

New born baby named Highwater

Piano floats away—Another floats in

High water warnings broadcast from airplane said by negroes to be voice of God announcing second flood

Looking into a floating Louisville house rescuers saw a parrot roosting on a piano Saved warmed and fed the bird squawked in a hoarse but cheerful voice This is fine This is fine

To calm Evansville refugees phonograph records were played over a factory's public address system The plaintive tune Mississippi Mud brought cheers—and raspberries

Turned over to the Red Cross at Evansville the Chrysler assembly plant was used as an emergency hospital At Cincinnati a Chevrolet plant turned to the manufacture of boats a cash register concern made oars

A Louisville home economics teacher joined the Red Cross forces Part of her class study equipment had been a crib with a big doll doubling for a real baby Returning later to her classroom on some errand she saw there in the crib a live negro baby snugly covered up doubling for the doll

Eunice Guthrie telephone operator at Lake City Arkansas remained at her switchboard for three and a half days



Photograph from World

**MUDDY TORRENTS POUR THROUGH A LEVEE BREAK NEAR NEW MADRID MISSOURI
DYNAMITED TO LOWER THE FLOOD CREST THAT MENACED CAIRO ILLINOIS**

Below Cairo where the Ohio empties into the Mississippi Army engineers have established the 131 000 acre Birds Point New Madrid Flood Basin into which surplus water can be diverted at will when the river is rising to dangerous levels (page 779) In normal years much land flooded only in emergencies cultivated and when flood does come these lands like farms along the Nile are richly fertilized with silt

put through 850 important long distance calls There was no one available to receive her

Rescuing farm animals near Henderson Kentucky when flood had subsided workers found where famished beasts had eaten all bark from trees to a height of six feet A farmer near Sorgho Kentucky had a cow and eight hogs in his bedroom—water was up to his second floor When found he was sitting on his bed milking the cow!

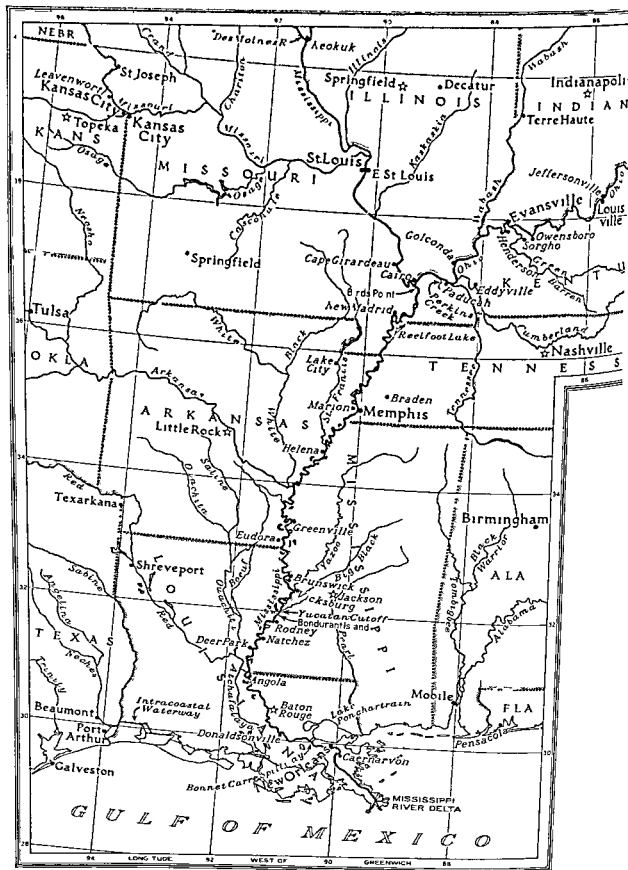
**A NAVY ON WHEELS AS COAST GUARD
BOATS RIDE RAILS LIKE CIRCUS TRAINS**

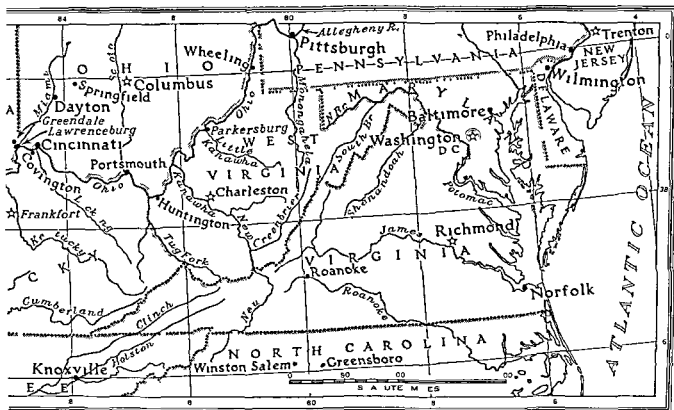
Coast Guard boats en route to Parkersburg from New York detained 20 miles above the West Virginia town and took to the water starting down what the com-

mander took for the Ohio River But both the Ohio and Little Kanawha out of their banks formed one whirling yellow sea

Pushing trees aside and dodging telephone wires for hours the fleet got lost Suddenly an angry voice called from St. Ignace darkness Get the — out of my chicken yard

Inland Americans never saw a more curious sight than long trains of flatcars loaded with Coast Guard boats rushing from Great Lakes ports from the Atlantic seaboard as far north as Maine bound for the flood Many Coast Guards unwilling to trust the handling of their favorite craft to landlubbers rode in the boats across the States foraging for food wherever trains halted (page 794)





Drawn by Newman Burns and

FLOWING 2 000 MILES FROM PITTSBURGH TO NEW ORLEANS THE OHIO MISSISSIPPI
STREAM CUTS A FASCINATING CROSS SECTION OF AMERICAN CULTURE

From coal mines and steel mills to cane and cotton fields it flows carrying much of the commerce
of the Nation—and often rising in fearsome flood

Our larger boats cruised down through the Gulf of Mexico and up the Mississippi, said Lieutenant Commander G. E. McCabe then at Memphis. Our amphibians flew in—and our smaller boats we shipped by rail. Ours was the biggest inland movement of boats in point of numbers in American history working under us were 329 of our own and about 72 other Government craft.

I saw a radio report to Memphis headquarters which hints at how much work was done by one Coast Guard unit alone—that at Evansville. Refugees transported 25 061 sick persons transported 894 food delivered 8 501 tons miles cruised 55 600 gas expended 33 189 gallons.

Variety actors have nothing on us said a Staten Island cutter man riding a self-bailing surfboat out of Vicksburg. First they saw drag off a dead horse. Then go feed somebody's cows marooned on the levees, then help the doctor catch some refugees who don't want to be inoculated.

I served three years in Alaska waters but never felt water as cold as this declared another. You can even hear the

frogs' teeth chatter when they try to croak.

Downstream from New Orleans where a roaring tree-laden current was churned to whitecaps by upriver Gulf winds we watched long lines of rubber-booted workers building pineboard barriers to stop lapping waves from eating into levee tops.

Below in lazy indifference life was as usual. I trapped 36 minks last winter said an ex-Marine who owns a small cane farm and sells syrup at a wayside stand. That helped—so did the two wild cattle I shot for meat. Sure the swamp is full of them but they see you first and go splashing away through brush and water. It's hard to get a shot.

Yes this is rich soil—everything grows—especially mosquitoes. But if it wasn't for mosquitoes this land would be so high priced a poor man like me couldn't touch it.

With Joe Roberts' Geographic camera man I rode this flood on Coast Guard and Army boats and prowled watery wastes behind the levees. There's a picture he'd say—and jump from one rocking boat to another or leap from a moving train or



HOW THE MISSISSIPPI'S MOUTH HAS CHANGED IN LESS THAN A CENTURY

Last quantities of sediment brought down from all mid America and dumped here in the Gulf of Mexico make the Mississippi Delta a constantly changing growing thing. These three maps of a 30-mile square show that far greater growth has taken place in the last half century than in the period between 1838 and 1885—a graphic commentary on how, with the plowing of the plains many States have been robbed of topsoil by erosion.

go flying off into the windy rain in some one's shabby old airplane.

Audacious, stubborn, determined, these adventurous knights of the lens! Once when Joe, camera in hand, was climbing precariously over a tumbled, floating lumber barge, a skipper said, "On Judgment Day, I'll bet my socks, that guy'll be right in the thick of it, snapping the goats getting separated from the sheep."

HUNGRY BIRDS RIDE THE WRECKAGE

Balanced on bobbing timber, Joe fitted his telescope lens ready to shoot a flock of crows, blackbirds, and gulls riding down river on logs and brush.

"Why do so many crows ride on drift wood?" I asked the old pilot who steered our "wet tail"—river slang for stern wheeler. "To eat what crawls out of the flood," he said. "Toads, bugs, snails, crickets, little snakes."

Variety was that Staten Island Coast Guard's word for flood scenes. He was right. Picked from a dirty dog-eared notebook come these stray reminders.

Hillbilly refugees at Vicksburg, playing guitars and singing piously, "I Can't Feel at Home in This Land Any More." Locomotives and a diner, under water. A car load of chickens, all drowned.

In Yazoo Basin, herds of deer swimming, fleeing the flood—only to be chased, on gaining dry ground, by dogs in cynnetic clamor. Quail, exhausted, falling into the flood wild turkeys in island willows.

In a skiff, a brakeman paddles along through flooded railroad yards below Natchez, throwing the switches.

Arkansas refugees refusing a CCC camp's fresh beef and hot biscuit, demanding salt pork, corn cakes, and molasses.

Tied to a tree is the floating body of a dead negro. "We had to save him till the insurance man saw him, his friends explain."

Pigs marooned on a levee near Rodney run toward our boat squealing to be taken off. In the 1927 flood, a bill goat got aboard a Coast Guard craft, and lived there five years!

Into one camp at Braden, Tennessee comes a Government playground man, bringing shiny new bows and arrows, skipping ropes, boxing gloves, basketballs, baseball outfits, horseshoe-pitching sets—all free—to entertain the refugees.

Fiddles scrape, banjos twang, and women social workers organize dances. A preacher calls the measures for a square dance.

He's done laid his Bible down, comments an Arkansas field hand who escaped only in boots and overalls.

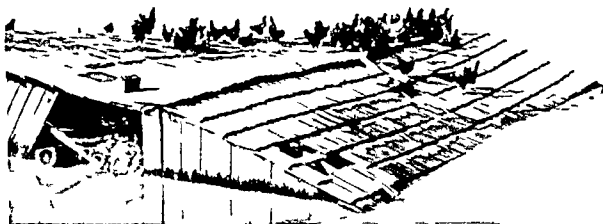
BANJOS HELP TO BANISH THE BLUES

To one ragged but engaging 10-year-old a dollar was given. "Now I can get some new guitar strings," said he.

Guitars and banjos! chuckled a Salvation Army worker who runs a gospel boat on the Yazoo. "They always grab them first when floods come."

When a horn blows, everybody rushes to get in line at a big dining hall.

Two-way radio telephones between boats were miraculous help in this flood work. Day and night we heard mysterious voices saving from the cold, wet air. This is



Photograph by AP from Ictures Inc.

BEWILDERED HUMANS SURVEY A WORLD OF WATER

Flood-wise old low-land men say deer are first of all animals to make for high ground when waters rise. Chickens stay and helplessly drown or starve as on this barn near New Madrid, Missouri.



Photograph from Acme

JUST A STRAY DOG IN ANY CITY STREET BUT HERE ANOTHER FLOOD VICTIM TO BE SAVED

Cattle and pigs on levees, poultry in trees, horses and mules standing so long in water that fish have nibbled skin from their legs—all these are among the dumb creatures that intelligent man with boats has taken from the floods. This rescue was made in the outskirts of Louisville, Kentucky.



FLOOD COMPLETELY SURROUNDS THE LEAD, FORT BELVOIR PLANT OF THE U S ARMY ENGINEERS, SET ON THE MISSISSIPPI'S WEST BANK, OPPOSITE MEMPHIS

U S Army Air Corps photograph from Memphis a Engineer District

High and dry on bluffs stands the Tennessee city in the background Across the swollen river to Arkansas stretches a bridge with a graded highway leading off to engineering headquarters safe behind a sea wall Along a partially submerged levee are tied towboats bridges steamers and engineers boats



FLOODED INDUSTRIAL PLANTS IN CINCINNATI'S MILL CREEK DISTRICT SHOW NEED FOR SOME PERMANENT FORM OF OHIO RIVER CONTROL. Backwater and the swift currents sweep no property away but its prolonged soaking effect involves enormous loss. Led by Army engineers the Government now gives intensive study to far reaching plans for dams storage basins and other flood control works not only on the Ohio but on many other important rivers.

U. S. Army Air Corps photo graph by Major Albert W. Stevens



Photograph by J. Baylor Roberts

REFUGEES LINE UP FOR FREE FOOD AT A RED CROSS STATION IN A GRINDING INDIANA SCHOOLHOUSE

Ministering in all to some 1,200,000 flood victims the Red Cross issued thousands of tons of food and clothing it directed rescue work by various Government and private forces doctoring the sick reuniting separated families and now supervises the tremendous task of resettlement and rehabilitation

the *Dione*—at Brunswick—taking off people and livestock. Turn on your searchlight so we can see where we are.

This is 244—we've got a tree against our beam—no headway. Propellers and shifts bent by drift logs. People on Deer Park Levee here won't come off without their cows!

Blending oddly with radio code's monotonous murmur in a Coast Guard boat's tiny cabin comes the strangely similar call of tree frogs in near-by willows. Now that you've said it, Sparks grumbles at me from between his earphones, you've got me hot and bothered those darn frogs do use a code.

To Vicksburg comes a Coast Guard ship's radio call reporting certain flood victims roosting on a house, and giving their location—after the manner of blue water men—by latitude and longitude!

Through a Memphis hotel lobby crowded with Coast Guard men and Red Cross nurses comes a page yelling, 'Mr. Romeo—call for Mr. Romeo!' With all these Juliets says a traveling man, Romeo must be here.

Out of Natchez a slow train whistles constantly—and often stops—to let thin cattle all hoofs, horns and tail stroll off the track.

Hung on a levee post is an old steamboat bell for calling plantation field hands to dinner. A girl in overalls roosts idly on it.

I didn't have my clothes off for two weeks, says a Paducah taximan. We moved 5,000 people in rowboats across Perkins Creek, some from tourist cabin roofs. Coast Guard scout boats with radios located 'em, reported to another station they had in the Irvin Cobb Hotel and we'd go get 'em. Lots of autos standing under water had their tops torn off by powerboats running over them.

Paducah signs read: Food for Workers Only. All day we found no coffee—a month after the flood hit this town of 35,000—only sandwiches and Coca-Cola in a sole surviving hot dog stand. Its sign read:

Lo e to all
Cred t to none
We lo e you all
But need the mon

At night we got coffee from the Red Cross feeding station in a schoolhouse.

Nobody could enter the littered mud-covered streets without a National Guard pass stuck in his hat.

Towing in steel barges we built a floating pier before the Irvin Cobb Hotel, said Red Cross Director Gus Myer. We moved over 30,000 people. Then he answered a phone call for 21 coffins. Once when a coffin call came in, I said to a colored truck man, Get the three from our backyard shed. Wide-eyed he quickly rushed back, saying the three coffins we thought were empty had people in them!

Everywhere we went from Cairo to the Gulf, men fought with lumber and sandbags to whip the flood.

Opposite Memphis on the Arkansas side one district engineer's staff occupies what is actually a vast fort, entirely hemmed about by high waterproof walls that defy the floods (page 774).

We have organized our six hundred miles of main stem levees as in battle, said Colonel Eugene Reybold. Flood fighters hold each sector of the river just as we would assign companies, battalions, brigades and divisions in wartime. Each sector commander must maintain at all costs the integrity of his levee line. Levees are patrolled day and night. With radio nets and field telephones we at headquarters are advised on a moment's notice what is taking place. Sandbags, lumber, tools and food are on hand and ready to move by land or water to any area where needed.

SIMPLE DIALOGUE ON HOW MAN WORKS TO TAME THIS BIG RIVER

Why do Army Engineers work on the levees?

Because in early days West Point men composed Uncle Sam's only group of trained engineers. They not only had to build forts, they also dug canals, built locks and roads and dredged and improved rivers and harbors.

How much earthwork has gone into all these Mississippi levees?

Mountains of it. In their busiest year 1932-33 engineers moved more than 125,000,000 cubic yards for one month; they moved an average of 613,000 cubic yards a day—or say about 950,000 one-ton truck loads. In plain words they made the dirt fly here nearly four times as fast as in their busiest days digging the Panama Canal.

How are levees built?

With earth which is dug and piled with tower machines, draglines, tractors, wagons and trucks. Sometimes a hydraulic dredge



Photograph from Acme

**BATTLING THE RISING OHIO MEN ERECT BULKHEAD EXTENSIONS ATOP THE
STEEL CONCRETE SEA WALL PROTECTING CAIRO, ILLINOIS**

The Cairo levee rises to 60 feet but a flood crest of 62 or 63 feet was predicted hence this topping¹ or heightening with lumber and sandbags. But when Army engineers diverted much water into near by floodways (page 769) they held the Cairo crest to 59.62 and kept the city dry.

pumps mud, or clamshell dredges work on floats.

Did Army men build the first Mississippi levees?

No indeed! French pioneers, founding New Orleans in the cypress swamps of 1718 soon afterwards built low dikes about three feet high to protect their rude huts from flood.

But if three foot dikes kept early New Orleans dry, why are some Delta levees now built up to 25 or more feet?

Simply because, long ago, whenever a big flood came—like the one De Soto's men saw in 1543—it spread easily out over the vast Delta lowlands, nature's own spill way, and slipped into the Gulf.

WHY MAN HAS BOUND A GIANT

Today, confined in levees and not allowed to spread, the river's surface at New Orleans may reach 20 feet above the high water mark of French times.

But why is the river now confined between 2,000 miles of high levees?

That tale is long—it involves many things from colonial frontiers to politics, local pride, and economic necessity. At this late date it seems safe to blame the pioneer French had they gone even as far upstream as where Baton Rouge now stands on high, dry ground, to found their settlement, they would have needed no levees.

But, once levee making began, and audacious man learned how miraculously fertile this Delta is not even the certainty of recurrent floods could keep him out.

Decade by decade the levee system spread. As early as 1844 levees reached as far north as the Arkansas. Finally, running beyond State lines beyond local engineering genius and financial ability, involving the politics of river navigation and even the problems of naval warfare, as in the siege of Vicksburg, the whole, vast, complex question of Mississippi flood control



Photograph courtesy Dr. Lewis Eckert from U. S. Engineer Office Nashville

FANTASTICALLY, LIKE SOME IMAGINARY TREE CLIMBING VARIETY OF BOVINE A DROWNED HUFER DANGLES HIGH IN AIR

Similar cases are recorded from previous floods. One theorist is that the beast swimming in high water became exhausted, laid its head between forked limbs to rest and was caught there as the flood subsided. Photographed on the lower Cumberland below Edenville, Kentucky.

and navigation fell into the ample long suffering lap of Uncle Sam.

Today when you look at rich populous powerful New Orleans at all the Delta's vast sugar rice fur farming and lumber lands at all the railways and great industries like refineries oil fields sulphur mines Celotex and sisal mills you can see how useful these levees are—and what a grave responsibility rests on the Corps of Engineers.

WHEN THE GIANT BURSTS ITS BONDS

Can the engineers keep all flood water between these big walls of dirt?

No they don't try. A gap exists in the levee of course wherever a tributary flows into the Mississippi. When it rose in 1937 for example higher than the level of the Yazoo River backwater from the Mississippi spread over some 1200 square miles of the Yazoo Valley creating the familiar old picture of submerged farms

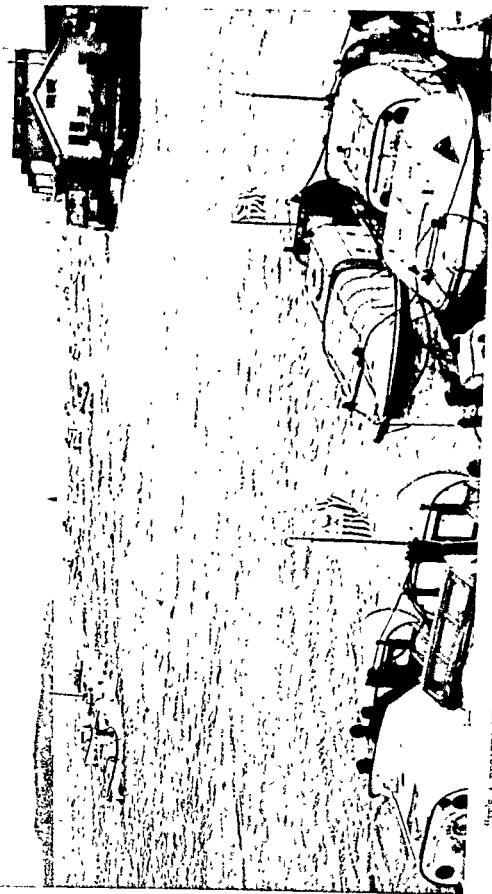
rescued refugees relief and Red Cross camps. The lower end of this Yazoo Valley like those of the St. Francis White Arkansas and Red Rivers forms what is called a natural overflow or flood basin.

It was backwater in such basins and not levee breaks which kept the Red Cross and Coast Guard so busy here in 1937 moving out people and livestock and caring for them.

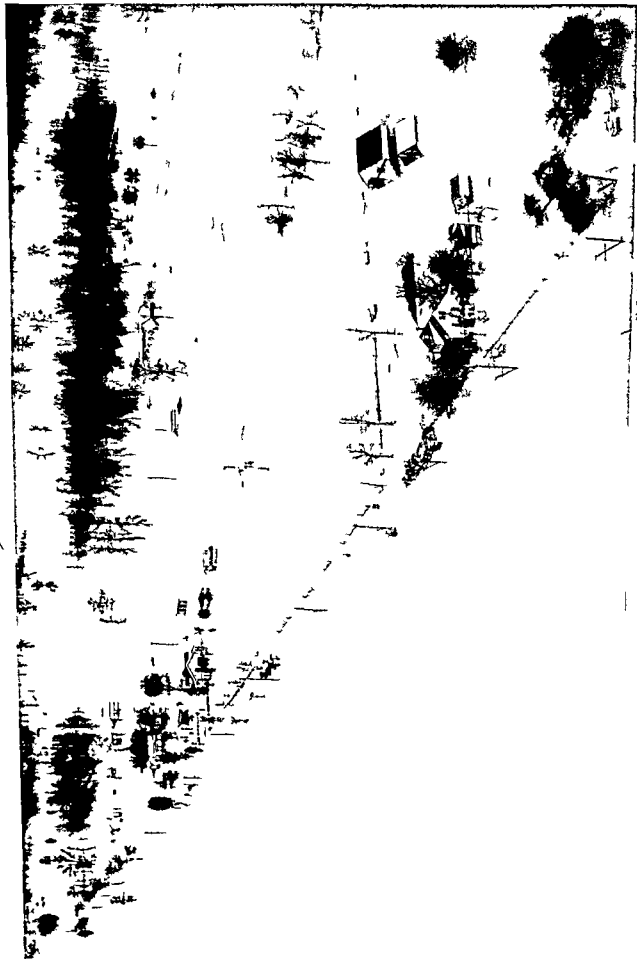
What is a fuse plug?

That's a stretch of levee which engineers purposely leave low so it can overflow when the river gets dangerously high and drain off surplus water into lowlands reserved for that emergency. In plain words a fuse plug is like the emergency spill way on any common earth dam.

Cairo, Illinois was saved from major disaster in 1937 not by its 60 foot sea wall alone but because engineers pulled their fuse plug and let surplus water pour into the 131,000-acre Birds Point New Madrid



"IT'S A REGATTA WITH HUMAN LIVES AS PRIZES," MIN SAID OF COAST GUARD FLFETS RACING ON FRANKS OF MURCY
This is how the racing Ohio River looked near Cairo in January and early February, 1917, when scores of Coast Guard and other boats patrolled it, answering radio calls for help, distributing food and medicine, and transporting those in peril. Happily for Cairo, levees and the floodway saved it from inundation (pages 769 and 278).



U S Army A C Corps Photograph by Via of Albert W S events

MORE LIKE A VAST INLAND SEA THAN A MERE RIVER THE OHIO IN PLACES SPREAD FOR MILES BEYOND ITS BANKS

Col. Lewis led cattle huddle in high spots on the road where water is shallowest. Horses seek the consolation of human hand by crowding close to kitchen windows. Many automobiles and trucks stand near a house. Trees windmills barns fences and telegraph poles sketch the pattern of farm homes against this watery waste.



Photograph from Acme

LOUISVILLE GROCERS IN SLIPPS DELIVER FOOD TO FLOODBOUND CUSTOMERS

Girls and men walk from second story windows to porch roofs viewing the scene which includes family motorcars standing deep in muddy currents. Disagreeable and dangerous was the failure of many water and light plants cleaning mud and slime from houses afterwards was a terrific task.



Photograph by J. Baylor Roberts

I CAN'T FEEL AT HOME IN THIS LAND ANY MORE SANG THESE YAZOO VALLEY REFUGEES AT VICKSBURG

Lodged at a Salvation Army home the met adversity with song. Thousands faced severe privations with courage and humor. Others said an Army aide haven't much to lose anyway. Perhaps I call they get saved from flood—and get free food and clothes. It couldn't be worse they say!

floodway (page 769) Seventy river miles south this flood flowed back into the Mississippi

What is the Bonnet Carre Spillway?

That's a big wood and steel gate 7 000 feet wide which engineers set in the levee above New Orleans on the Mississippi's left bank. It was opened—a panel or needle at a time—in February 1937 to drain part of the big flood into Lake Pontchartrain and thence into the Gulf.

Might the levees have broken but for the new Bonnet Carre Spillway?

It was built to avoid just that risk. In 1927 the State of Louisiana dynamited the main levee at Caernarvon just below New Orleans because it was feared that city was in danger.

ENEMIES OF THE LEVEES

What makes levees break?

We hope levee breaks are a thing of the past engineers answer. Crevasses here tofore were due to overtopping to sand boils seepage sloughing—and in small weak levees probably to crawfish holes. Wave wash from cross winds and steamer wakes may cause breaks when water is high up on the levees.

What is the Atchafalaya Basin?

That's another huge natural flood basin in south central Louisiana. Some say it's the old course of the Mississippi itself. It takes off now from the Red River near Angola and carries a veritable rolling velvet sea down to the Gulf west of New Orleans in every major flood. To help it function the Army has dredged deeper channels for it and built three systems of levees and guide levees in it. Its chief stream is the Atchafalaya some 70 miles below its head it splits into many channels—like the Nile Delta—which finally spread into shallow lakes that drain into the Gulf.

You hear that Army Engineers have shortened the Mississippi by some 100 miles between the mouths of the Arkansas and Red Rivers with a dozen cutoffs. What are these?

Look down from an airplane (page 789). See how the river loops and bends especially above Greenville, Mississippi. So tortuous is the stream here that boats in making 40 meandering miles may steer twice into every point of the compass.

To straighten out, shorten and speed up flood flow to stabilize the river channel

the engineers cut directly through 11 necks or points formed by these sinuous bends. To navigation these cutoffs initiated by General Harlev B. Ferguson, President of the Mississippi River Commission, are of infinite value. They also help in flood control by speeding up discharge.

A MISSISSIPPI IN MINIATURE

The Mississippi River Commission—what is that?

A body set up by Congress in 1879 to work on river problems—floods and navigation—which had been increasingly troublesome since the Mississippi came wholly into the territorial limits of the United States after the War of 1812-14.

This Commission, made up of Army and civilian engineers, now has its headquarters at Vicksburg, from here it supervises U. S. Army District Engineers stationed at various cities from Memphis to New Orleans. Each great watershed in the United States forms an Army Engineers District. The Commission's offices stand in the hills of Vicksburg National Military Park, where monuments mark the old Union and Confederate lines in the siege of Vicksburg.

If you doubt that engineers have imagination, look at their 1 100-foot miniature model of the lower river built on a 245-acre tract near this park, at what is known officially as the United States Waterways Experiment Station. This model of the river from Helena, Arkansas, to Donaldsonville, Louisiana, permits the study of flood control plans for much of the lower valley and the overflow areas of its alluvial plain.

Forests are represented by fine bent wires, levees, bends, bars and cutoffs are all graphically shown in miniature works powdered coal moved by the tiny currents shows how silt is handled by the real river.

Like children at play, building their puny bridges or little mud dams in a backyard river formed by heavy summer showers, serious-minded Army engineers here also play—but very keenly—for what they can learn from this tiny model stream. To them its behavior as to floods is made to rise and fall at will, is full of lessons. By it they learn where sand bars may form or levee breaks occur or where new cutoffs may come (page 785).

A vast experimental hill houses volumetric measuring tanks and apparatus for the study of stream velocity, spillways and settling basins.



Photograph courtesy U. S. Army Corps of Engineers

MUD FLIES 300 FEET HIGH AND MANY FISH ARE KILLED WHEN ENGINEERS USE DYNAMITE TO HELP OPEN SARAH CUTOFF 40 MILES BELOW GREENVILLE

A cutoff is an artificial channel cut between two bends in the river to straighten its course (page 789). By digging 11 such cutoffs and using dynamite, man has actually shortened the lower stream by more than 100 miles. "They aid navigation and they help control floods by speeding up discharge," an engineer explained, "letting flood water get down stream in a bigger hurry."

Study models have also been built here of the New York and Los Angeles harbors, San Francisco Bay, and—for the Standard Oil Company—a complete model of the Lake of Maracaibo in Venezuela.

MANY A MIDWEST FARM NOW LIES AT THE MISSISSIPPI'S MOUTH

Here, too, silt studies are carried on with a view to determining how much sediment is carried by the river. It has been estimated for example that from the State of Missouri alone in a flood year a mud pie a mile square and about 600 feet deep is dumped into the Mississippi.

Measuring the sediment it carries, engineers estimate that in one day during high water the big river may carry 1 886 000 000 pounds past a given point. In easier words, mud enough to load about 23 600 railway cars of 40 tons capacity, or 472 freight trains of 50 cars each.

Look how the river has built its Delta for scores of miles out into the Gulf, and you can imagine how enormous its annual cargo of mud is (map page 772).

Have Army engineers other work to do in this big basin besides flood control and keeping the lower Mississippi channel deep and wide enough for navigation?



Photograph courtesy Mississippi River Commission

NEAR VICKSBURG U S ARMY ENGINEERS BUILT A MINIATURE MODEL OF THE
LOWER MISSISSIPPI FOR USE IN FLOOD CONTROL STUDIES

From the lake at the left water is drawn at will for simulating flood conditions in the tiny river. Here are Lilliputian levees, toy forests are made of bent wire, and fine coal dust is moved about by baby currents showing just how the big river forms sand bars, cuts away banks, and scours deep holes in its channel (page 783)

Plenty of it. They built fifty odd locks in the Ohio and its upper tributaries, the Allegheny and Monongahela, opening this long waterway to enormous traffic. From Minneapolis to St. Louis they are building locks and dams opening this water route to the Northwest to deeper draft boats. The big dam in the Missouri at Fort Peck is being built by Army engineers, but the power dam in the Mississippi at Keokuk was built by private enterprise.

Today, thanks to Army Engineers, lumber boats and barges haul goods to and from Leavenworth, Kansas, on the Missouri up and down the Mississippi as far

north as St. Paul and Minneapolis, and, by the Illinois River and ship canal between the Great Lakes and the Mississippi.

Dredging snags and sand bars, deepening channels, revetting banks is all part of their work.

Finally, under the Flood Control Act of 1928, they did a seven year job of study and survey concerning more than 150 dams and reservoirs which may eventually be built in scores of Mississippi tributaries. Sites chosen for such proposed reservoirs are scattered from Montana to Pennsylvania.

Engineers' opinion is that such reser-



Photograph by Twinkling Star

MOOING COWS CLIMBING UPSTAIRS AND WALKING OUT ON YOUR SLEEPING PORCH CAN BE MORE THAN A NIGHTMARE IN HIGH WATER TIMES

Here she is on a porch in Paducah—and was the occupant of the house surprised? Some where under that unexpected lake there's a lawn maybe with flower beds and nice gravel walks. What a clean up job when the water goes.

voirs which might cost close to a billion dollars would be most useful for local flood control and would also have a moderate effect in diminishing super floods in the lower Mississippi. Others say a giant storage reservoir perhaps near Cairo might cover as much ground as the two States of New Jersey and Delaware and still lower but slightly any huge flood going into the lower Mississippi.

A perfect example of how storage dams may control floods is shown in the case of the Great Lakes and the St. Lawrence. But look at the size of the Great Lakes!

Does ice ever worry the engineers?

It certainly does on the upper river. "Ice works like a steam shovel," said a Coast Guard officer. It breaks up wharves, cuts down walls, smashes ferry boats, and tears up big trees by the roots.

Where Green River flows into the Ohio I saw trees laid flat by the ice and stripped clean of bark.

The Ohio ice pack above Evansville in February 1936 was 10 to 25 feet thick. The field was 110 miles long from Owensboro, Kentucky to Celina, Illinois. In

bad ice years melting cakes float down the Mississippi as far as Baton Rouge.

In 1918 ice jammed the river from bank to bank at many places in its middle reaches. It tore dozens of steamers and barges loose from their moorings. Many sank and others were carried downstream in the floes. At Vicksburg, usually considered a balmy southern city, only a 200-foot channel remained free of ice. Army engineers have dynamited ice jams in the Missouri as far north as Bismarck, North Dakota.

RIVERS BED IS EVER CHANGING

Even when the levee system is complete under the Government's Adopted Plan will all Delta lands be protected?

No, only about half. But the other half is mostly uninhabited or still in brush and swampy woods.

This big river eats at its own banks, scours deep holes here and there, and shifts its bed.

After every big flood—when currents may scour holes 200 feet deep in spots—we find new changes in river bed bars.



Photograph by J. Baylo Roberts

**PUBLIC HEALTH OFFICERS ORDERED FORMER INHABITANTS TO KEEP OUT OF
FLOOD WRECKED HOMES TILL SANITATION SQUADS COULD CLEAN UP**

Mud plastered slime soaked rugs beds and other furniture littered the streets of stricken cities as here in Paducah. Rehabilitation with restoration of light and waterworks is a long costly job that must go on for months after the flood subsides.

and channels said a pilot. A 200 year old map shows for example, that Bondurant Island has moved 8 or 10 miles down stream by erosion on its upper end and accretion below.

What is a revetment?

When caving banks threaten some critical point save near a city or engineers feel the river bottom needs patching they carpet it with a mat called a revetment. Once such mats were woven of willows now articulated concrete slabs are mostly used or a mattress made of steel web covered with asphalt (page 788).

Do the levees run right down to the shores of the Gulf of Mexico?

No. They terminate some miles upstream where the river forks into many passes. Two of these South and South west are the improved channels open to navigation by seagoing craft.

Grade line for levee top was first established all the way from Cairo to the Gulf in 1883. Though levees were built to this height floods soon showed they were still too low over and over they broke. It seemed that the higher men built the

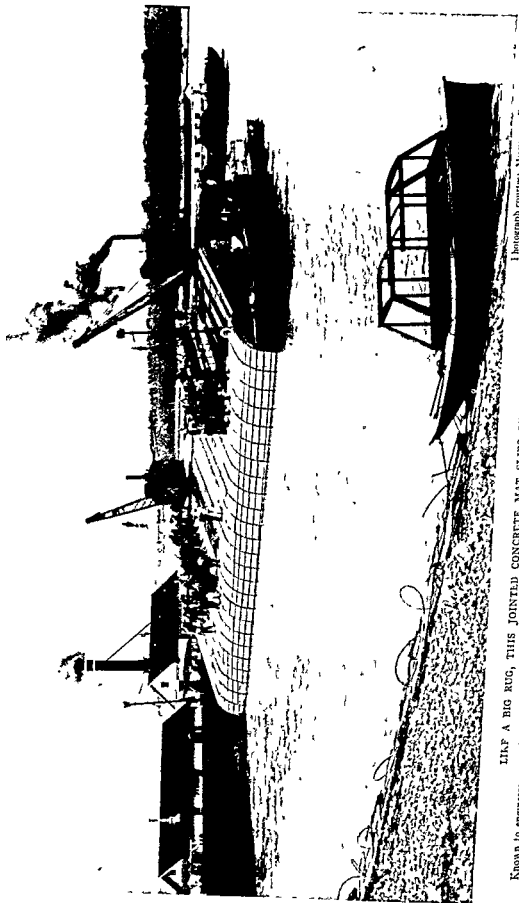
levees the higher went the floods—with more and more levee breaks or crevasses.

Then came 1927's flood highest then recorded. Again levees broke and 600,000 people were moved from flooded lands.* This led to the most thorough flood control study the Government had yet made and later to the adoption of a great plan for higher levees and for floodways. This plan modified and extended in 1936 is now about half carried out.

On river reaches actually used by commerce as from the barge jammed Monongahela down the Ohio and Mississippi prodigious cargoes now move.

Ohio traffic began when whites first explored its valley. During more than a century this Belle Riviere as the French called it helped enormously in the settlement and growth of much of the United States. It was a busy moving water street which carried pioneer emigrants to the wilderness. Down it floated hundreds of thousands—in barges keelboats flatboats.

* See "The Great Mississippi Flood of 1927" by Frederick S. Pritchett in THE NATIONAL GEOGRAPHIC MAGAZINE, September 1927.



LIAP A BIG RUG, THIS JOINTED CONCRETE MAT SLIPS OFF A BARGE TO LIL ON LI VFI BANKS

Photograph courtesy Mississippi River Commission

Known to engineers as an "articulated concrete mattress" its purpose is to protect earthen levee banks from wear and tear of moving water. Other mats, similarly laid are made of pliable but heavy metal screen covered with an asphalt mastic. This scene is near Cairo, Illinois.

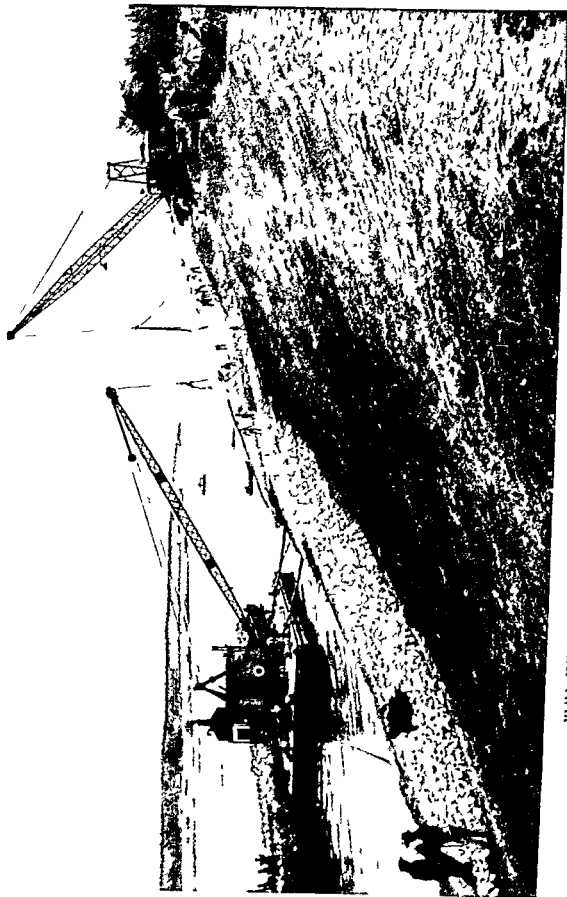
stop grass or weeds from sprouting and making holes in such mats, salt is put under them.



Photograph courtesy Mississippi River Commission

OUR FILMS SHOW WHAT AMAZING LOOPS AND SINUOUS BENDS THE MIANDERING LOWER MISSISSIPPI MAKES

Here are the "Greenville Bends," between Mississippi and southern Arkansas. Greenville, Mississippi at the extreme right, is protected by levees. Tarpley, Leland, and Ashbrook Cutoffs are seen, showing how the river channel has been straightened and shortened.



HEAVY STONES HELD TO KATP OLD MAN RIVER FROM CRAWLING AWAY HIS BINKS

Photograph from Memphis Enquirer D. 17-11

Men and machines along the Mississippi are the levee binks and lay rip-up paving to protect them from waves and currents. In earlier days protective mats were often made of woven willows or other small trees. Now concrete or asphalt mats are more general (page 288). This stone rippaging is being used in the Gayoso Bend text west 1/2 miles south of New Madrid Missouri



L S W Y R Cof 11 opat b by Ma or Albert W Stevens

THE HARD HIT LOUISVILLE ARFA

OHIO RIVER WATERS ENGULFED MANY ACRES OF HOMES AND FACTORIES IN THE FOREGROUND APPEARS THE KENTUCKY CITY'S LOW POINT SECTION WITH ITS PARTLY SUBMERGED GASOLINE TANKS, WATERFRONT HOUSES, AND INDUSTRIAL PLANTS. ACROSS THE SWOLLEN RIVER IS FLOODED JEFFERSONVILLE, INDIANA. AGAINST THE APPROACH TO THE RAILROAD BRIDGE ARE STREWN FRAGMENTS OF HOUSES, BOATS, AND BRIDGES MIXED WITH OTHER FLOTSAM FROM UP THE OHIO. SCORES OF LIVES WERE LOST IN THIS VICINITY.

—carrying flintlocks, families, chickens, pigs, horses, cows, plows, spinning wheels, iron kettles, axes, saws, and animal traps.

New Orleans was long the best market for fur, corn, pork, venison hams, barrel staves, lard, bear oil, and other pioneer products of the Mississippi Valley. Coon skin cap men barged their cargoes down, sold raft and all for cash—then fought their way back north on foot through hostile Indians and white bandit gangs.

From Pittsburgh for New Orleans in 1811 sailed the Mississippi's first steamer. Her captain was a Nicholas J. Roosevelt. Below the falls of the Ohio this primitive boat felt the fury of New Madrid's historic earthquake. Bluffs slid into the stream, islands sank, or changed form. From Cairo down to the Arkansas River the earth rose and fell in undulations. Forests and fields sank to form Tennessee's now famous Reel Foot Lake.

Through storm and seismic chaos the pioneer *New Orleans* held her way, between New Madrid and Vick's Plantation—now Vicksburg—then stood no other town or settlement. Yet by 1857, two to three thousand steamboats yearly were trading at new towns along the river, and tying up at noisy, congested Canal Street Dock in New Orleans.

Before railways the upper Mississippi also afforded man an economic trade route. Traffic reached its peak between 1850 and 1860, when some 1,100 steamboats reached St. Paul.

After rails came, an increasing share of traffic began to move east and west, with much ore and grain shifting from rails to Great Lakes ships. Lumber and log car goes downstream dwindled.

The Government has spent millions working for a nine-foot channel up to the Twin Cities and considerable traffic is now carried by oil companies, Government operated barges, and others.

ACRES OF BARGES REPLACE THE ROMANTIC OLD PACKET BOATS

Familiar to all who love this romantic river is its Golden Age of ornate, sumptuous packet boats, the exciting race between the *Vatches* and the *Robert F. Lee*, and our literary mayonnaise over beauties in hoop skirts, slick gamblers, gallant old colonels and banjo-playing roustabouts.

† See "Reelfoot—an Earthquake Lake" by Wilbur A. Nelson in *THE NATIONAL GEOGRAPHIC MAGAZINE*, January 1914.

After the Civil War, railways gradually ended all that. Then the World War, calling suddenly for every kind of transport, started us using rivers again. Uncle Sam helped by starting his own barge lines.

Now on the Ohio, with all its locks and canals, and on the Mississippi below St. Louis, far more freight moves than ever moved in the halcyon days of packets. You might load 150 old time packets, say, with coal or steel at Pittsburgh, and they would carry no more than one modern barge tow.

Look at the *Sprague*, a stern wheeler now used by Standard Oil to push its barges about the lower Mississippi. On one trip the *Sprague* towed 65 barges, hauling 40,000 tons of coal. 'We don't count barge units in such big loads,' said a river pilot. 'We just ask, 'How many acres are you towing?''

'What kind of freight rides the rivers?' you ask.

'Everything,' they say, "from beer and canned fruit to guano and gasoline."

Since our wheat exports fell off, more cargo now moves upstream than down. For St. Louis oddly enough, the chief bulk cargo on Federal barges is coffee and sugar—which also ride as far north as Twin Cities. Southbound, with various other cargo, may come patent medicines for sale on southern plantations.

Copied from ships' papers, here are random river-cargo items: cattle, oysters, shells, coffee, sugar, fruits, rice, rubber, seeds, textiles, bags, cotton, logs, lumber, pulp board, cement, oil and gasoline, sulphur, ores, scrap, farm machinery, automobiles and trucks, chemicals, rock phosphate, barley, corn, wheat, coal, concrete, iron and steel products, soap and matches.

While above Cairo on the Mississippi Federal barges haul most of the freight, on the Ohio private carriers handle 95 per cent of all traffic—mostly coal, steel products, cement, oil, and similar heavy cargo. Volume runs into millions of tons.

Pittsburgh, Wheeling, Cincinnati, Louisville, Evansville, St. Louis, Memphis, Baton Rouge, New Orleans—all trade by river, even through the Intracoastal Waterway to Houston, Texas.

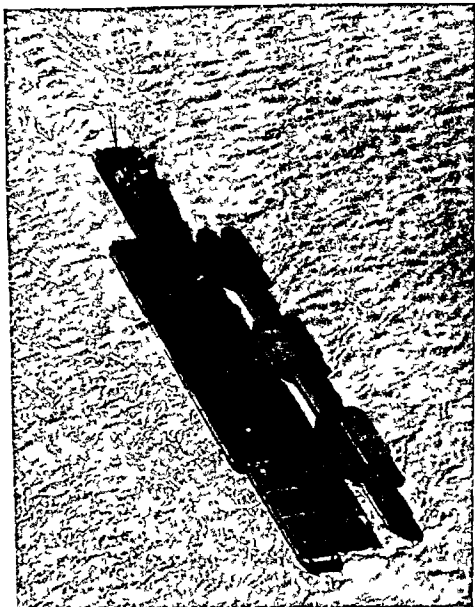
Birmingham benefits it ships iron pipe, for example, down to the Gulf coast across to and up the Mississippi to the Illinois River, and thence through the ship canal to Chicago and the Great Lakes.

Memphis receiving up to 2,000,000 tons of goods a year at its 21 barge terminals, breaks up these cargoes and reships them by rail in seven different directions. Trucks, rails, and oil pipelines all tie in with river craft to make our flexible transport net more accessible. Who outside the business knows we have about 100,000 miles of pipelines?

But in some smaller rivers Government boats that keep the channels open are about the only craft in use. The upper Mississippi for example though long a highway for pioneer emigrants and fur traders and much used in Indian war days for transporting troops and supplies — when fights raged between Indians on the banks and soldiers on board ship — now is little used for transport.

As to the Mississippi however Uncle Sam looks on it as a traffic artery of national rather than local importance and in any national view of all river improvements many questions besides flood control and navigation must enter.

First may be the problems of power irrigation erosion then of course pure water supply for cities and towns. Involved also is pollution from sewers, mines, and factory waste.



H. A. Lete Meade A. photo

TURNING A SWEET WHEEL AS PILOTS SAY, SHE DRIVES HER 17 LOADED BARGES THROUGH TURBULENT OHIO FLOODS

Since the World War American inland waterways transportation has been enormously revived. Besides Federal barges operated by Uncle Sam's Inland Waterways Corporation, many privately owned fleets are run by oil, steel, coal and other freighting interests. Romantic and picturesque were the "floating palaces" of ante bellum days but a single modern barge today may carry 100 to 150 times as much freight as an old time packet boat.

At times of low water stagnant pools are ever a menace. Storage dams in many places might keep such streams flowing even in drought.

BATTLE ON A TITANIC SCALE

Local pride, politics, logrolling, all are aspects of every government. They make river works costly. No doubt in older lands like Egypt, India, Iraq and China—where for thousands of years men have wrestled with river problems there has also been



© International News

**ASTONISHED INLAND AMERICANS SAW LONG RAILWAY TRAINS LOADED WITH SURF
BOATS AND UNIFORMED COAST GUARDS RUSHING TO THE FLOODS**

These boats being loaded at Jersey City are part of the greatest fleet ever sent to American inland waters. Manned by plucky crews hundreds of such craft in January 1937 helped to rescue the drowning and to care for thousands of homeless hungry victims of high water. Working in cold rain and darkness these heroic blue water men themselves were often without food or dry clothing for hours yet remained characteristically cheerful cracking their sailor jokes even in face of personal peril (pages 69 and 780)

waste of money. That seems inseparable from all hydraulic adventure on the titanic scale necessary in battle with big rivers.

Since 1543 when whites first saw a great Mississippi flood infinite hours dollars—and words—have been spent on these high waters and their control.

**UNCLE SAM IS MAKING THE MISSISSIPPI
BEHAVE**

Cutting down forests overgrazing plowing up grass and draining swamps all tend to increase local floods their effect on super floods in the lower Mississippi—because of incalculable water volume—must be negligible in seasons of heavy, widespread continuous rain. But Army engineers have now proved—with their levees their spillways and overflow basins—that they can control high water below Cairo.

There remains the huge problem of the Ohio.

All downstream—in Wheeling Parkersburg Huntington Portsmouth Cincinnati Lawrenceburg Jeffersonville Louisville Evansville Paducah men ask: How can we control this river?

Trouble is said an old Cincinnati water front man. Lots of this land where houses are really always has belonged to the river. People just keep encroaching on the river with mills and warehouses and wharves making it narrower and narrower. Then when it gets high and must spread there's no place for it to spread except up into somebody's second story windows.

But whether with dams flood basins or levees—or with all these—here is another big problem for the Army engineers.

A MODERN PILGRIM'S MAP OF THE BRITISH ISLES

By ANDREW H. BROWN

HELD by the pigeonry of Coronation, the attention of all peoples has recently been focused on England, where millions of devoted subjects acclaimed their new King and Queen, George VI and Elizabeth. A decorative Modern Pilgrim's Map of the British Isles, distributed to members of the National Geographic Society with this issue of their Magazine, will be of timely usefulness to multitudes of readers pondering once again that 'little world' whose 'happy breed of men' has made such staggering contributions to human civilization and culture.

Particularly for English, Scottish, Welsh, and Irish members, for Australians, New Zealanders, Canadians, South Africans, and for Americans who cherish British ancestry and traditions, but also for other hosts of interested members, the new ten color map appears at a most opportune moment.

Lavish decorative detail, including a border made up of 44 drawings of some of Britain's most famous people and places, emphasizes the amazing political, artistic, and scientific achievements of a land which is heart of an empire with more than one fourth of the world's total population distributed over about a quarter of its habitable surface. The Isles themselves, on a total area not quite twice that of New England, support over two fifths as many inhabitants as the whole United States.

A MAP COMBINING SCIENCE WITH ART

This unusual chart, designed by C. E. Riddiford, shows in detail an area recently pictured on a smaller scale in The Society's Map of Europe. Asia, Africa, the United States, Canada, both Polar regions, the Caribbean, the Pacific and the World have also appeared in the important series issued to members in recent years as special supplements to their National Geographic Magazine.

The map is drawn on a conic projection with two standard parallels on the generous scale of 1:1,622,000. Over all dimensions including the border are 36¼ inches by 29¼. Eye appeal has been particularly stressed in the design. Old styles of decoration have been brilliantly revived to provide suitable embellishment.

Rich baroque cartouches fill the four corners, reviving the technique of 16th- and 17th century cartographers. They frame charming full color scenes typical of the four geographical divisions of the Isles. The various national emblems are given a place above each scene: three lions for England, Scottish lion rampant, dragon for Wales, and the Irish harp. In the extreme corners appear the national floral emblems: rose for England, thistle for Scotland, shamrock for Ireland, and leek for Wales.

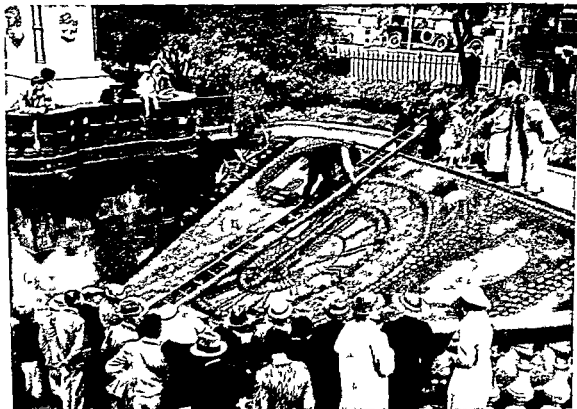
Prominent in the upper right-hand quadrant is the title and legend cartouche, spotlighting the full title in a decorated box. Below a drawing of the King and Queen and the Royal Arms, a detailed legend provides a key for the intelligent use of the map. Appropriate symbols direct the reader to cathedral towns, interesting churches and abbeys, places with castles, picturesque villages, famous mansions, battle fields, lighthouses, racing centers, radio stations, and ancient monuments.

GUIDE TO THE AMERICAN SHRINELAND

Places which may be grouped under the collective title of the American Shrineland are shown in sienna red. Many localities in the British Isles having an intimate connection with American history are thus brought to the attention of American readers and others interested in the interrelation of the United States and the Old World land from which the Nation sprang.

Coats of arms of chief cities of the five countries contained within the Isles are distributed at intervals around the border. That of London (the first city not only of England, but also of the United Kingdom and the Empire) is centered at the top. The right border bears coats of arms of Edinburgh (for Scotland) and Cardiff (for Wales), while those of Belfast (for Northern Ireland) and Dublin (for the Irish Free State) are spaced along the left edge.

Forty-four pictures, alternately of British figures and scenes characteristic of the five countries, are interspersed between heraldic emblems of the border. Here are shown such historic personalities as Elizabeth Cromwell, Shakespeare, Darwin, and Watt, and such notable sights as Killarney,



© Scott Pictorial Press

A GARDENER KEEPS EDINBURGH'S FLORAL CLOCK IN TRIM

This decorative timepiece actually keeps time. Underground mechanism turns the two hands around a ten foot dial formed of growing flowers and tiny shrubs. Here strollers in Princes Street Gardens pause to watch the gardener at work.

Stonehenge Canterbury Big Ben, and Abbotsford

A compass rose a scale indicated by a big pair of dividers drawings of liners and fishing smacks on the sea waves clouds and angel head blowers are additional decorative details that beautify the map.

NORSE VOYAGERS KNW ENGLAND

Norse voyagers observing the lush green ness of the English coast named it Engle land according to one theory meaning in their tongue meadowland. But most authorities believe England takes its name rather from Angle-land—land of the Angles who emigrated there from the Continent chiefly in the fifth and sixth centuries. A genial Dutchman later described the same territory as "a pleasant island off the coast of Holland." Today at the hub of the world's land hemisphere gigantic little Great Britain occupies a dominant position in world culture statesmanship and trade.

Earliest inhabitants left archeological puzzles for modern minds. Prehistoric civil-

izations built monuments which today's scientists date in the end of the Stone Age and the beginning of the Bronze. The linteled monoliths of Stonehenge are familiar at least in picture to everyone; only a few of Avebury Circle's huge unhewn megaliths remain erect. Pre-Roman Britain is largely prehistoric Britain: a period about which chroniclers still must theorize.

Monumental evidences of Rome's four and a half century dominance from B.C. 55 to A.D. 410 are numerous. Motorists now roar along straight stretches that follow old Roman roads. Well-preserved relics are certain sections of Hadrian's 73-mile Roman Wall which once formed an unbroken barricade from Bowness to Wallsend across the top of England.

In 410 the year after the Goths sacked Rome Honorius left England with the last of the legions warning natives to look to their own defenses. Leaderless now the people could not resist Saxon invasion.

At tiny Ebbsfleet on the Strait of Dover landed the Jutish chieftains Hengist and Horsa. Returners of Germanic habits

Native Britons lacking Roman discipline resisted vainly and conquerors and conquered merged. At Eborac also landed Saint Augustine and his little band of missionaries a century and a half later to spread the seeds of Christian fervor that afterward took tangible form in glorious medieval religious architecture.

Generations of struggle and adaptation were climaxed in 1066 at Battle with Saxon Harold's defeat by William the Conqueror and his Normans at the Battle of Hastings. The Conquest wedded Norman culture to Saxon strength. The offspring was modern Britain—the Britain of friendly charming villages clustered in parklike countryside and heathery moorlands; the Britain of cathedrals and castles, cottages and manor houses, wild glens and gentle dales, rocky coasts and hoary mountain peaks—the Britain that our Modern Pilgrim seeks. Guidebooks star and double star the places he must see. And then only half the story is told.

PILGRIMS STILL WEND TO CANTERBURY

From every shire end of Engeland to Canterbury they wend, said Chaucer in *The Canterbury Tales*, of his very human pilgrims. Today they come from every shire end of the earth to the capital of the English Church, seat of the Archbishop of Canterbury, Primate of All England. With the triumphant dominance of its soaring central tower, Canterbury Cathedral on one of the main routes between London and Dover is the goal of many a Modern Pilgrim.

Other cathedrals lift their splendid spires above thatch and timber of the older inhabited England of the south and east. Salisbury, pure Early English and externally perhaps most satisfying of all. Winchester among all the world's churches excelled in length only by St. Peter's in Rome. Wells, comparatively small but exceptionally beautiful, encrusted with rich sculptures, varied Ely dominating the Fen Country like a great solitary ship at sea. Peterborough with its noble nave and magnificently arched west front, hilltopping, towering Lincoln outstanding for harmonious integration of masses and detail. York Minster with perfectly matched towers and lustrous stained glass, and sturdy old Durham of the awe-inspiring Norman nave.

Symbols on this map also lead our pil-

grim to interesting churches and abbeys. Over in the valley of the Wye lie the romantic ruins of Tintern Abbey, associated with Wordsworth's *Lines Composed A Few Miles Above Tintern Abbey*—verses that gave English poetry a new start. Up in Lancashire's Vale of Death, Nightshade iron mining castle building abbots erected Furness Abbey, whose ruins of rose red sandstone include two remarkable effigies of Norman knights in armor.

Cistercian monks of Yorkshire founded Fountains Abbey in 1132. Today the ruins of the warming house, refectory, and a vaulted 100-yard long cellarium cluster around the roofless church in grass carpeted shady grounds. So perfect is the Abbey of Hexham in Northumberland that it has been called the textbook of Early English architecture.

Close to the border of Wales, land of the double J, Llanthony Abbey was founded in 1103, but the lonely monks moved soon to Gloucester, having no mind to sing to the wolves.

Scotland has Sweetheart Abbey, named from the wish of the founder, the widow of John Balliol, that her husband's heart be buried with her. Only a few miles separate Melrose, Jedburgh, and Dryburgh Abbeys—all underlined on pilgrimage itineraries. Among profuse carvings in Roslin Chapel near Edinburgh are those on the Prentice Pillar, supposedly chiseled by an apprentice during the absence of his master who slew him in a fit of jealousy when he returned.

Ireland's ninth century round towers were mostly built near abbeys and monasteries, apparently as watchtowers. Entrances were usually six or eight feet above the ground and ladders took the place of stairs within. Antrim has the greatest of them, nearly a hundred feet high. Monasterboice with its sculptured Celtic cross is one of many historic abbeys in St. Patrick's island.

SPLENDOR FALLS ON CASTLE WALLS

Castles. The centuries roll back as our modern pilgrimage leads us beneath medieval walls that speak of King Arthur and his Table Round of Shakespeare's kings, reciting eloquent iambs from gloomy battlements of great Elizabeth, playing cat and mouse with Mary Queen of Scots, of the whole glowing pageant of British history.

In England there are Windsor, near London, chief residence of the sovereigns of England for more than 850 years; St. Michael's Mount in Cornwall, a smaller version of famed Mont St. Michel across the Channel; wild Fintona, where legend says King Arthur was born; 12th century Ludlow Castle, where Milton's masque of *Comus* was first performed in 1634; Kenilworth, the splendid medieval fortress that gave its name to one of Sir Walter Scott's great novels; feudal Warwick, the most princely seat within these midland parts of the realm, with its armor, paintings and cedars in the park.*

In Wales, grim Conway, most perfect of Welsh ruins; Caernarvon, where the first Prince of Wales is said to have been born; today, probably the most complete medieval fortress in the world; Harlech, whose defence in 1468 is commemorated by the stirring song *The March of the Men of Harlech*, imposing Pembroke, which withstood a month's battering from Cromwell's cannon but capitulated when its water supply was cut off.

Scotland has Balmoral, the King's Highland home beloved of Queen Victoria; Skye's Dunvegan, seat of the clan Macleod, protected by a Fairy Flag, surrounded on three sides by water and on four by ghosts; Glamis, the family seat of Britain's new Queen Elizabeth; and traditionally the scene of Duncan's murder by ambitious Macbeth, battle-mentored Cawdor, near Nairn, another of Macbeth's strongholds, with a mantelpiece carving that antedates the introduction of tobacco to Britain; yet shows monks smoking pipes; Edinburgh Castle, where James Sixth of Scotland, First of England, was born to unite warring nations and high Stirling, set between shining loops of the River Forth and the great brotherhood of Highland peaks to the north.

LAND OF BLARNEY AND BANSHEE

And in Ireland, Blarney, where the gift of cajolery comes to him who kisses the Blarney Stone; ragged Dunluce, haunted by the baneful banshee; and Kilmacoman Castle, where Spenser wrote the first three books of *The Faerie Queene*.

With charming villages and handsome cities the British Isles are surfeited. Over

ford and Cambridge, exhibiting the perfection of medieval architecture and possessing Britain's most influential universities, are almost as basic as London for the briefest tour.

The patchwork of England's fields and forests, the wild glens of Wales and Scotland, and the green pastures of Ireland are studded with eye-filling clusters of cottages. There are dozens of best villages. Who that has seen them can forget Bishop Burton, Castle Combe, Finchfield, Clovelly, Polperro, Broadway, Lynton, Lower Slaughter, West Wycombe? For each of these there are a dozen more, just or almost as fine.

WIFREY EXCALIBUR WAS HURLED

But places neither of particular scenic nor historic fame have other interest that makes them milestones on our modern pilgrimage. Dozmary Toot in Cornwall is the lake into which Sir Bedivere is supposed to have thrown King Arthur's sword Excalibur.

During four centuries of border warfare, Berwick on Tweed changed hands between England and Scotland 13 times. Finally ceded to England in 1482, it was declared a neutral county, but now it is considered part of Northumberland.

Objects placed in the Dropping Well at Knarborough near Harrogate turn to stone. Parasols, sponges, Teddy bears, gloves, hats, or other articles hung to soak may be reclaimed a year later—perfectly petrified by the dripping calcifying waters.

In the parish churchyard of Llangollen in Wales, he buried the Ladies of Llangollen. Eccentric Lady Eleanor Butler and Sarah Ponsonby, swearing eternal friendship, left Ireland in 1776 and came to Llangollen to devote their lives to celibacy and the knitting of blue stockings.

Still shown to visitors is the Royal Hotel room at Portree, Isle of Skye, where Bonnie Prince Charlie, the Young Pretender, said farewell to Flora MacDonald, the Hebridean beauty who had befriended him during his ill-fated 1745 rebellion. Disguised as her maid in flowered linen gown and quilted petticoat, he had fled with her to Skye after his disastrous defeat at Culloden Moor.

Under Culbin Sands, beside the Moray Firth, is buried a village which was suddenly overwhelmed in a great sandstorm of 1694. Dunes, many of them 100 feet high,

* See Warwick Castle, Stage for Old England's Pageantry, NATIONAL GEOGRAPHIC MAGAZINE, July 1936.



Photograph from Philip D. Gendreau

DIGNITY MUST BE DISCARDED WHEN YOU KISS THE BLARNEY STONE

Iron bars and the firm grip of an attendant make it possible to bend backward and downward to perform the feat—which is supposed to endow the kisser with the gift of smooth cajoling speech. The wonder-working talisman is inconveniently located in the parapet of Blarney Castle in County Cork, Irish Free State. If the pilgrim slips it is a clear drop of more than 100 feet to the ground.

today cover old house walls and 4 000 acres of land once known as the Granary of Moray. Legend says that some days before the disaster an old woman thought to be a witch was refused charity in the hamlet and left breathing a curse on its stony hearted inhabitants.

A Norman castle stands at one end of the Thomond Bridge over the River Shannon at Limerick in Ireland. At the other end is a big boulder much chipped by souvenir hunters—the famous Treaty Stone. Here is commemorated Patrick Sarsfield, gloomy, gallant Irish patriot who signed the Treaty of Limerick, ending a prolonged and bloody siege of the walled city during the Jacobite wars.

Galway is the drowsiest most magical most Irish of towns. The peat smoke from the houses assails your nostrils with a necromancy, and the old ache comes in your soul and looking westward to the ocean the ache is satisfied, for before you

lie the three islands of Aran in the conger hunted herring wealthy sea.*

The Society's new map shows all these and hundreds more though even the ambitious Modern Pilgrim will trace only a narrow circuitous path through the tempting maze of names.

Nature has lavished Arcadian beauties on each of the countries in the Isles. The peaceful winding Thames meadow bordered or overhung with thick trunked trees best satisfies one pilgrim's taste. Another hungers for cloud scraping spurs of Ben Nevis, Snowdon or Scafell while a third thrills to the awesome vacancy of Yorkshire or Highland moors.

Short distances separate landscapes of startling diversity. Sudden contrasts in scenery follow within a few miles going from the green plain of Solway to the pikes

* See Ireland: The Rock Whence I Was Hewn by Donn Byrne in THE NATIONAL GEOGRAPHIC MAGAZINE for March 1927.

and fells of the Lake District or from boggy borders of The Wash to heavy ridges of the Peak District. In the field hemmed windings of the Wye to the steep shoulders of Wales's Brecon Beacons. From the wooded shores of the Dart to uncompromising desolation on Dartmoor from the Yorkshire Moors to green billows of the Dale Country, from Renfrew firthlands to the humped and folded Grampians from the Box of Allen to the Wicklow Mountains or, for that matter, from London Bridge to the windy South Downs or from Chidebank alleys to the glens of Arran.

BRITAIN AT PLAY

To satisfy the British love of sports are held Solent regattas, Gleneagles and St. Andrews golf tournaments, Melton Mowbray and Market Harborough hunts, tennis matches everywhere, Highland bird shoots and deer chases, salmon fishing on the Shannon, the Liffey, or the Spey.

Spectator sports draw multitudes: the Braemar Highland Games in the valley of the Dee, hair-raising motorcycle races on the Isle of Man, football games at Wembley, rowing races at Henley-on-Thames, international tennis matches at Wimbledon, horse racing classics at Newmarket, Epsom, Ascot and Aintree, test cricket matches on Lord's Cricket Ground in London.

Human mermaids and mermen splash, whoop and sift sand through their toes at the great shore resorts of Brighton, Bournemouth, Blackpool, Scarborough, Llandudno and Aberystwyth. (Blackpool at play is as much one of the great sights of England as Westminster Cathedral.) Inland Harrogate, Droitwich and Bath offer fashion, frolic, and mineral waters potent for curing aches and ennui.

Prosperous Stratford-on-Avon, birth place and burial place of William Shakespeare and boomed by festival performances of his plays is naturally Exhibit A of poet and author Britain. Memories of men who dealt in the witchery of words haunt hundreds of cottages, villages and landscapes. The Lake District will always be associated with Wordsworth, Coleridge and Southey, Dorsetshire and the whole south-west of England with the Wessex of Thomas Hardy's novels, Box Hill and the vicinity of Dorking with George Meredith.

Warwickshire cherishes memories of George Eliot, Kent of Dickens, Shropshire of A. E. Housman and Mary Webb,

Chawton in Hampshire of Jane Austen, the best of novelists. Tichfield remembers Dr. Johnson, Haworth, at the edge of bleak Yorkshire moors, is inseparable from the gifted Brontës.

In Scotland there are Abbotsford, on the Tweed, where Sir Walter Scott wrote away a gigantic debt; Auld Ayr, whom near a town surprises for honest men and bonnie lasses, heart of the Burns country; Kilmarnock, birthplace of Sir J. M. Barrie, and the Thrums of his tales. Fife, known to all through Robert Louis Stevenson's stirring yarns, Ireland remembers Jeremy Taylor at *Millmead*, Jonathan Swift at *Salbrook*, near Carrickfergus, James Joyce in Connemara. The Modern Pilgrim can hardly traverse a shire without crossing some illustrious poet's path.

ANCESTRAL HOMES OF AMERICA'S FOUNDERS

Though few of the actual founders of the United States were born abroad most of them were of British stock. Today, racial ties of blood, tradition, and common speech bind Americans to the people and the land of their origin. In a sense the American in Britain is 'going home' when he seeks out the places (shown on the map in red) associated with the builders of his country.

Mecca of the American Shrineland pilgrimage is Sulgrave Manor, at the western extremity of the broad Midland and East Anglian area containing the most important of the shrines. The little stone manor house (now a Washington museum) is the ancestral home of the Washington family and therefore of George Washington, father of our offspring democracy. In the old church at Brington are memorials to several members of the famous family, including the grandfather of John Washington, who emigrated to Virginia and became the great great grandfather of George.

A bronze tablet in the 13th century church of Ecton commemorates Benjamin Franklin, whose ancestors were born in this village. At Floore the pilgrim is guided to a thatched cottage, ancestral home of John Adams, America's first Vice President.

In this parish for many generations lived the Lincolns, ancestors of the American Abraham Lincoln. begins an inscription in the church at Hingham in the heart of Norfolk. William Penn, who, although

born and buried in England, founded Pennsylvania and devoted his life to America, lies in the Quakers' burial ground at Jordans, in Buckinghamshire. In 1589 at Austerfield was born Governor William Bradford, 'the first American citizen of the English race who bore rule by the free choice of his brethren.'

Scrooby, in Nottinghamshire, was the birthplace of William Brewster, Elder of the Pilgrim Church, and really the birthplace of the religious revolt which led to the sailing of the *Mayflower* for America. From Plymouth in Devon to Plymouth in America the tiny ship sailed in 1620 with 102 emigrants seeking freedom in the New World. On English Plymouth's Barbican, the old quay from which the crowded vessel cast off, a new memorial commemorates the fateful departure.

At Boston, in Lincolnshire, the mother town of the greater Massachusetts city, John Cotton, the Patriarch of New England, was vicar before he emigrated to America in 1633. Also at Boston is the gloomy prison where many of the Pilgrim Fathers were confined in 1607.

Harvard House, an old half-timbered building on High Street, in Stratford-on-Avon was the birthplace of the mother of



Photograph from Philip D. Gendreau

FOR "THE SETTING OF THE WATCH" THE RIPON HORNBLOWER
'PRODUCES A WILD MOOD OF DEEP AND DISMAL MELANCHOLY'

Modern listeners in this Yorkshire market town may set their pocket watches by the sad notes, but the ceremony derives its name from the placing of a guard over the town. In lawn coat and three-cornered Dick Turpin hat, the hornblower sounds four blasts here in the market square and three before the mayor's house every night at nine. The custom is supposed to date from the days of Alfred the Great.

John Harvard, for whom Harvard University was named.

Elihu Yale, patron of Yale University, lies buried in the churchyard of Wrexham, in Wales.

BRITAIN AT WORK

London is the brain, the Midlands the heart, wires the nerves, and railways the veins of industrial, commercial, modern Britain—the Britain of smelters and seaports, mines, mills, and markets. Inevitable

is its efficiency—amazing are the contrasts with the old Britain which it draws.

The railroads of England, Wales, and Scotland alone would encircle the earth in the latitude of Cádiz while their highways (in 1935) would make almost nine world girdling loops along the same parallel.

British ports handle the world's greatest trade. British and foreign vessels bring from harbors of other countries about four fifths of the fruits and breadstuffs consumed in Great Britain; one half the meat, eggs, and dairy products, and one third of the fish and vegetables. In 1935 ships carried away from Britain's shores cotton, textiles, woollens, pottery, and glassware, machinery, locomotives, and innumerable other iron and steel manufactures to a total value of 328,937,000 pounds sterling—more than one and a half billion dollars.

Prodigious quantities of rubber from Malaya, wheat from Canada and Australia, timber from New Zealand, gold from Africa, and cotton from India pass through British ports en route to markets of the world, making Great Britain a vast clearing house for interchange of the products of her dominions and colonies.*

More than a third of all this traffic is shipped up and down the Thames to and from the Port of London. Through Liverpool's seven miles of docks passes about a fifth of the trade. These two ports together with Southampton, Hull, Manchester, and Glasgow handle more than three-fourths of Great Britain's total ocean-borne commerce.

SHOES AND SHIPS AND SEALING WAX

The diversity of manufactures is entering King's Lynn near The Wash makes merry go rounds, lavender water,

* See *As London Tells and Spins*, by Fredrick Simpson in *THE NATIONAL GEOGRAPHIC MAGAZINE* for January 1937.

factories bring fame to Hitchin. Worcester shops turn out gloves, porcelain shoes. Gloucester makes wagons, matches, and toys. Cakes and ale from Shrewsbury, and Banbury tickle the world's palates. Coventry makes bicycles, automobiles, airplanes, sewing machines, and artificial silk by the carload.

Burton on Trent produces about 3,000,000 barrels of beer annually; the unsightly district called The Potteries turns out pottery and porcelain wares of all kinds, including Wedgwood Spode and Minton boot making. Stafford was once toasted by one of its representatives in Parliament—May the trade of Stafford be trod under foot by all the world.

Slag and cinder heaps have largely replaced vegetation in the industrial Midlands and north, where clay, coal, and iron have brought wealth and smoke to Birmingham, Nottingham, Sheffield, Leeds, Bradford, and Manchester. Outside of England, the prosperity of thousands of workers and owners depends entirely on production in the mills of Glasgow, in Scotland; Cardiff and Swansea in Wales; Belfast and Dublin in Ireland. Two out of every three British steamers are either built on the Clyde or are there supplied with engines. Belfast yards launch much of the remaining tonnage.

At night, flames and sparks shooting upward from thousands of Black Country chimneys and blast furnaces create a spectacular modern Inferno. In Ripon, little more than a hundred miles away, a horn blower observes the 1,000-year-old custom of the setting of the watch, with four blasts sounded in the market square and three before the mayor's house (page 801).

So Britain, beloved by millions throughout the world, cherishes and preserves the old while still moving in the van of progress.

Because some members have expressed a wish to have for reference the technical findings of the National Geographic Society U. S. Army Air Corps Stratosphere Flight of Explorer II in 1935, The Society has published these reports in a monograph, The monograph Stratosphere Series No. 2, contains 211 photographs and diagrams and in addition a supplement 17 by 24 inches showing the lateral curvature of the earth. Copies may be obtained by addressing the Secretary, National Geographic Society, Washington, D. C., for \$1.50 each, postpaid in the United States and its possessions elsewhere 25 cents additional.



HE WAS HEADING FOR "HOME SWEET HOME" WHEN -BANG! A BLOW-OUT!

TRAFFIC was heavy that blistering hot Summer afternoon as Mr. F. P. Keenan of Chicago, returning from a business trip, sped along Waukegan Road. His passenger and most of the talking Mr. Keenan was too busy keeping one eye glued on the oncoming traffic in the other lane.

"We're making pretty good time," Keenan's pal said. He couldn't reach Home Sweet Home quickly enough.

A Close Shave

Bang! Like a thunderbolt, the stark crack of a blow-out rose above the roar of the motor. In desperation, he gave the steering wheel one final frenzied tug. The car bolted—lurched to the right—and came to a stop at the brink of a deep ditch. They were safe—yes! But after that close call, no wonder Mr. P. Keenan will tell you that he now believes in miracles.

It took Goodrich engineers to fight this driving hazard for American motorists and provide them with a real defense against high speed blow-outs. They invented

Read **TED HUSING'S** account of the terror-crowded moments experienced by a Chicago motorist

the now famous Life-Saver Golden Ply which is found only in Goodrich Silvertown Tires. This remarkable Golden Ply is a layer of special rubber and lull floating cords scientifically treated to resist internal tire heat. By resisting this heat, I am told, the Golden Ply keeps rubber and fabric from separating—keeps blisters from forming. Thus the blow-out that might have been never gets a start.

Are Your Tires Safe?

You can bet your bottom dollar that Mr. F. P. Keenan of Chicago is now riding on Silvertowns. My advice to every motorist who has his own and his family's safety at heart is to see these life-saving tires at any Goodrich Silvertown Store or Goodrich Dealer's. The sooner the safer.



FREE! Millions have joined the Silvertown Safety League—pledged to drive safely. See your Goodrich dealer and join now. Nothing to buy. We'll get you **FREE** a handsome emblem with red crystal reflector to protect you if you're in a tight fix.

Goodrich SAFETY Silvertown

With Life-Saver Golden Ply Blow-Out Protection

*Discriminating Vacationists
Are Turning to*
**ATLANTIC
CITY**

... finding extra strength and vigor on the sunny, breeze-swept beaches
... new delight in strolling or gliding in a roller chair over eight fascinating miles of boardwalk.

Enjoy golf, tennis, and deep-sea fishing ... get the 'lift' of a dip in the surf ... Furnished residences and apartments. Choice hotel accommodations

*For illustrated
folder write*
Room 203
Convention Hall
Atlantic City, N. J.



for a real vacation

COME to this compact State for sparkling beaches and blue waters ... marvelous swimming, boating and fishing ... or to enjoy its picturesque, historic spots, lovely gardens and peaceful countryside. Here you'll find gay resorts ... famed educational institutions ... sporting events ... modern industries. Plan to stop or stay in

RHODE ISLAND

*A great State
in which to enjoy life!*

Secretary of State,
219 D State House Prov., R. I.

Please send me full information on RHODE ISLAND

Name

Address

**SEASON'S MOST COMPLETE
WORLD CRUISE**

"Perfect climate" world cruise sails October 16th. Five months. Strictly first class. Finest hotels. Itinerary all-inclusive. Membership limited.

Secure details from travel agent or

JAMES BORING CO. INC.

655 FIFTH AVENUE NEW YORK, N. Y.
333 N. MICHIGAN AVENUE CHICAGO, ILL.

COME DOWN TO THE SEA!
NANTUCKET ISLAND of whaling fame is a charming vacationland, 30 miles off Massachusetts, where summer is five Septembers long. All sports, swimming, fishing, sailing and hunting. Miles of beaches. Ideal for children. Excellent hotels and real New England food. Information and attractive booklets from Dept. 1, Publicity Committee, Nantucket, Mass.

NANTUCKET
A DELIGHTFUL ISLAND
THIRTY MILES AT SEA

The **Rock Island** **"FOUR" CASTS**
**YOUR MOST
GLORIOUS VACATION**

FOUR of our most inspiring National Parks
Carlsbad Caverns Yosemite Yellowstone and Rocky Mountain all in one grand circle of the scenic West!
Out via the incomparable Golden State Route to

CALIFORNIA
Three fast air-conditioned trains from Chicago daily
the all Pullman Golden State Limited depart
their Tourist Car California the Apache catering
to all classes of travel

Through Golden State Route service also from Minneapolis-St. Paul, Des Moines, St. Louis and Memphis.
Back through the mountain grandeur of

COLORADO

Return via San Francisco Salt Lake City and the air conditioned Rocky Mountain Limited from Denver or Colorado Springs

Or go out through Colorado back via the Golden State Route

Very low fares that will permit an unusual outing this summer. Ask about low cost all-expense tours to Colorado Yellowstone California or the Pacific Northwest

ROCK ISLAND

MAIL THIS COUPON

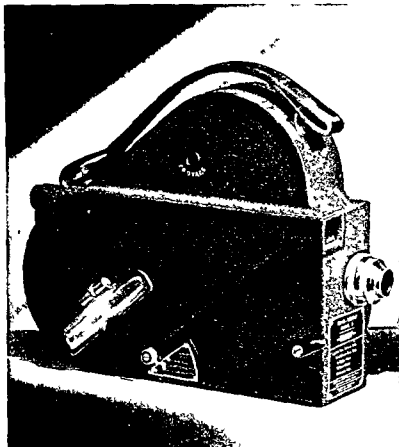
W. J. Leahy Passenger Traffic Mgr., Rock Island Lines
713 La Salle St. Station Chicago, Ill.

Please quote fares and forward printed matter on
☐ the Southwest and California ☐ Colorado ☐ All
expense Tours. (Check box letters desired.)

Name

Address

Take a look
at Eastman's
new 16 mm.
movie
camera...



CINÉ-KODAK "E"

and then
look at
the price

\$48⁵⁰

AN Eastman 16 mm camera for movies in black and white and in full color Kodachrome so complete and versatile that it covers the whole range of your picture taking needs

Note the special features: Fixed focus—you just aim and shoot. Famous precision made Kodak Anastigmat f 3.5 lens. Three speeds—Normal, Intermediate and Slow Motion. A simplified gate enormously facilitates loading. A supplementary footage

scale beside the finder field enables you to gauge scene length and film supply as you sight and shoot. Takes all 50 or 100 foot 16 mm Cine Kodak Films.

At \$48.50, this new camera sets a low price record for Eastman 16 mm Cine Kodaks. Get your dealer to show you the new "E". He also has Cine Kodak "K" at \$88.50 and Magazine Cine Kodak, at \$125, in this same 16 mm line. Eastman Kodak Company, Rochester, N. Y.



The supplementary footage indicator shows, while shooting, how much film you're using.



The customary footage indicator for ready reference when you're not running camera.



Triple speed device giving you a full range of picture effects—including slow motion.



You needn't bother to thread the "E" a simplified gate. Just press it back—clip in film.

THIS NEW MODEL "E" MAKES MOVIES IN GORGEOUS FULL COLOR WITH KODACHROME FILM...
NO EXTRAS TO BUY, NO GADGETS—EASY TO MAKE AS BLACK AND-WHITE



Nova Scotia fisherman mending his nets

Nova Scotia

"THIS IS THE LAND OF HEART'S DESIRE"

Ramsay MacDonald, former Prime Minister of Great Britain
This is Acadia where men still harvest the sea and the land as did their fathers before them. Quiet is the countryside where tolling church bells blend into the distant skirling of a Highlander's bagpipes. Here the still fragrance of pine forests is eternally stirred by cool winds from the ocean. Great three-century old oaks the French built it all hold back the mighty Tides of Fundy. Here are the ports the Grand Banks Fishermen call home. This is a land of peace where the hospitality of a friendly people awaits you; economically and easily reached by steamship, rail or motor. 23 hours from New York, overnight from Boston.

GOVERNMENT BUREAU OF INFORMATION
142 HOLLIS STREET HALIFAX N S



Royal coat of arms, Nova Scotia, granted in 1625 by King Charles I



Mellon Travelers Cheques provide a convenient and safe means of carrying expense money on trips. With currency in your purse there is constant anxiety whereas with Cheques you have the comforting knowledge that your funds are safe. Mellon Travelers Cheques are accepted everywhere in payment of any item of expense. Ask for them at your own bank.

MELLON NATIONAL BANK
PITTSBURGH
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

TO FAR-OFF LANDS...

Thrill to rare adventure, join this greatest club of its kind! Member ship brings you illustrated monthly magazine, travel booklets, exchange of letters with members all over the world. Only \$1 a year U.S. & Canada, 3 years \$2.25 (Foreign Member ship \$1.50 International M.O. 3 years \$3). Send check or money order to Room 102, 25 Broadway, N.Y.



CUNARD WHITE STAR TRAVEL CLUB

FOR BROADER HORIZONS

Rich experiences in the age of the camera to travelers and to those who equip with the Bausch & Lomb Binocular



SEND FOR CATALOG—40 pages, 60 views, 16 maps. Tell us what selection of binoculars. Describes 11 Bausch & Lomb models \$65 to \$135. Free literature request. Bausch & Lomb Optical Co., 518 Lomb Park, Rochester, N.Y.

BAUSCH & LOMB

Binoculars

THE WORLD'S BEST—BY ANY TEST.



Walk in the sandals of romance in...happy

Wherever the sandals of romance take you in Japan there is radiant friendliness... in the warm color of busy streets and ancient temples... in beautiful gardens... and always, in the smiling faces of her cordial people. ★ ★ ★ All things blend in exquisite Japan. Luxury... Beauty... Adventure and Economy. ★ ★ ★ GO THIS SUMMER. Fast, modern ships have made Japan your neighbor. The rate of exchange is generously in your favor.

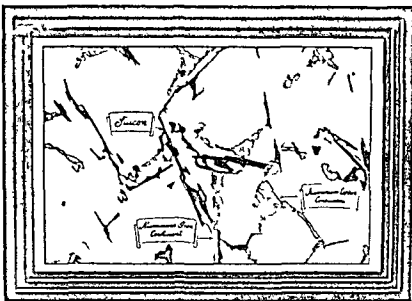
JAPAN

BOARD OF TOURIST INDUSTRY
JAPANESE GOVERNMENT RAILWAYS

WRITE FOR (COLORFUL BOOKLETS)

Address JAPAN TOURIST BUREAU 401 5th Ave., New York N.Y. 10011 S. Broadway, Los Angeles, Calif.
See your local TRAVEL AGENT for full details and brochures.

Mention the Geographic—It identifies you."



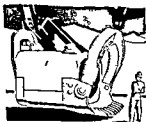
Photograph of a typical aluminum alloy through a microscope to produce a magnification of 500 times.

NEW METALS MADE TO ORDER

Useful Alloys of Aluminum Do Not Just Happen

SOMEWHERE in the literature describing nearly any new product you will find the statement 'made of new alloy'. More and more frequently you find the words 'of aluminum' finishing up the phrase.

The word *alloy* has become an industrial commonplace yet the very fact of alloys is one of the significant things in modern industry.



For industry can progress only as its materials improve. The metals including aluminum are among industry's important materials. And alloys are simply

metals built to industry's own specifications.

An alloy begins with a metal having certain dominant natural characteristics. Additional qualities are developed by deliberate combination with other metals. The result is virtually a new metal with certain properties greatly improved and with new kinds of usefulness.

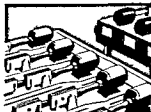
The natural characteristics of aluminum are lightness, resistance to corrosion, and excellent heat conductivity. When there is a need in industry for these intrinsic advantages coupled with a new set of physical properties such as greater strength or hardness, research is called upon to develop a new alloy.

The specifications demanded become a definite problem for attack in the laboratory by metallurgists and other scientists who are grounded in the theory and the history of alloy development.

After they have determined the best

metals and the amounts of each which need to be combined with aluminum to meet the specifications, the alloy is put through thousands of tests to determine whether the desired qualities have been achieved and particularly whether the results are uniformly dependable.

The experts in manufacturing have their innings too. Can the alloy be cast or worked as intended? How does it machine? What of welding? How about surface finish? And finally, what of the cost? Can the alloy be made at a cost which will enable industry to use it with true economy?



It takes men to make an alloy — many men. It takes extensive (and expensive) equipment. And it takes time.

Research has already developed many different alloys of aluminum, each with its own special combination of useful characteristics. How many more will be needed by industry, only time can tell. Some we are searching for at this writing, and what we are learning in such study will be helpful in meeting the even stiffer specifications which industry most certainly will be laying down tomorrow.



This is one of the ways we are accepting our responsibility to industry and to the general public, one of the ways in which we are trying to better our own business and our profits by making aluminum an increasingly useful metal.





The pause that refreshes ... and cools

Gone is winter's cooling snow. But cooling ice cold Coca Cola is around the corner from anywhere every day of the year. And where are you? On your way right now to a break — a cheerful fountain—if you want to enjoy the pause that refreshes and cools.

